NOAA FISHERIES
NATIONAL MARINE FISHERIES SERVICE

Authorizations and Permits for Protected Species (APPS)

File #: 21233
Title: • Demographic and life history studies of sea
Modification: 2

Applicant Information

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Project Information

File Number: 21233

Application Status: **Application Complete**

Project Title: • Demographic and life history studies of sea turtle populations in the Atlantic Ocean, Gulf of Mexico, Caribbean Sea, and tributaries

Project Status: Renewal

Previous Federal or State Permit/Authorization: NMFS 16733

Permit/Authorization Requested:
- ESA Section 10(a)(1)(A) permit (other) - Issued

Where will activities occur? US Locations including offshore waters

Research Timeframe: **Start:** 08/07/2018 **End:** 09/30/2027

Sampling Season/Project Duration: The sampling will be conducted year round for a 10-year period and beyond as permitted. As NMFS is mandated to provide for the recovery and protection of ESA-listed sea turtles, monitoring and sampling these populations is essential to meeting these objectives. As such, our research is ongoing and is planned into the future in order to assess the health and status of sea turtle populations. Our research occurs throughout the year with more activity in the spring, summer, and fall. Seasonal sampling periods are set to maximize effort relative to favorable field conditions (weather and sea state) and to coincide with collaborators. More specific details are provided under each separate project when available.

Abstract: The Southeast Fisheries Science Center (SEFSC) of the National Marine Fisheries Service is responsible for science-based assessment and conservation of sea turtle populations in the North Atlantic, Gulf of Mexico, and portions of the Caribbean Sea and embayments. Our mission is to provide the best available data and information to support science-based management decisions and promote the conservation of sea turtles and their habitats. Directed research to fill data gaps will be performed on loggerhead (Caretta caretta), green (Chelonia mydas), Kemp's ridley (Lepidochelys kempii), hawksbill (Eretmochelys imbricata), leatherback (Dermochelys coriacea), olive ridley (Lepidochelys olivacea), and hybrid sea turtles. Numerous activities, including direct capture, sampling fisheries bycatch, biopsy collection, flipper tagging, and satellite tagging, are employed by the SEFSC throughout this region. Ultimately, this research will provide new data to improve stock assessments, assess the impact of anthropogenic activities, and better manage and, ultimately, recover these species.

For a period of ten years, We are requesting to sample annually 870 loggerheads (555 Table 1, 315 Table 2), 665 greens (370 Table 1, 295 Table 2), 575 Kemp's ridleys (360 Table 1, 215 Table 2), 120 hawksbills (21 Table 1, 99 Table 2), 245 leatherbacks (18 Table 1, 227 Table 2), 11 olive ridleys (Table 1), and 23 unidentified/hybrid hardshells (18 Table 1, 5 Table 2). We are requesting the lethal take of 2 loggerheads, 2 Kemp's ridleys, 2 greens, 1 leatherback, 1 olive ridley, and 1 hawksbill over the life of the permit.

Project Description

Purpose: The National Marine Fisheries Service (NMFS) Southeast Fisheries Science Center (SEFSC) Sea Turtle Program is requesting a research permit to fulfill our mission to conduct science-based assessment and conservation of sea turtles populations in the US EEZ and international waters of the Northwest Atlantic, Gulf of Mexico and portions of the Caribbean Sea. In all, six species of sea turtles utilize these waters: leatherback, loggerhead, green, hawksbill, Kemp's ridley and olive ridley. Under the Endangered Species Act (ESA) and the Magnuson-Stevens Fishery Conservation and Management Act (MSA), the National Marine Fisheries Service manages sea turtles at the population level rather than the species level. Each of these species requires accurate assessment of status to ensure their continued presence as functioning elements of these ecosystems.

Collectively, the goal of SEFSC research efforts is to allow evaluation of sea turtle stock status in a conceptual framework that facilitates prediction of the effects natural and anthropogenic stressors may have on these long-lived, late-maturing species. The SEFSC Sea Turtle Program's mission is to provide research to support effective management interventions to reduce bycatch and other detrimental human interactions with sea turtle populations, to evaluate the success of these management interventions, and thereby ensure that these species are restored and preserved for future generations.

Significant detrimental impacts due to human activities have been documented for many sea turtle populations. The major threats identified include coastal development, habitat degradation (e.g., pollution, loss of prey, harmful algal blooms, hypoxic zones), energy development (oil and gas exploration and extraction), military activities, ocean noise, fishery interactions, and impacts from climate change. Research on sea turtle species allows for the development of effective management strategies to reduce or eliminate these threats. In addition, research and monitoring of sea turtle populations provides information on ecosystem changes that may affect multiple animal populations and human health.

Assessments of population status require an accounting of the human-induced mortalities, accurate estimates of abundance, and a complete understanding of population structure and mixing rates among populations. The SEFSC Sea Turtle Program maintains core capabilities to address these needs and has researchers at laboratories in Beaufort, North Carolina, Miami, Florida, Pascagoula, Mississippi, and Galveston, Texas. Scientists use aerial surveys to estimate abundance, quantify spatial distribution, and identify habitat requirements for the species encountered. The SEFSC also conducts in-water field research to estimate abundance, provide estimates for population parameters, and collect samples for genetic and health assessment studies of sea turtles along the U.S. Atlantic coast and in the Gulf of Mexico.

For some species, research on the movements of individual animals through telemetry are also conducted and integrated with genetic data to produce a more complete understanding of historical and present day population structure. These studies also examine habitat use and seasonal migratory movements. Mortality estimation, habitat modeling, and foraging ecology studies provide increased insight into the interactions between sea turtles and the ecosystems they inhabit and enhances conservation and management capabilities. Our objectives include determining movements, fine-scale habitat characteristics and selection, delineation of foraging and nursery areas, and examining how turtle distributions correlate with temporal trends and environmental data.

The research conducted by the SEFSC Sea Turtle Program (STP) feeds directly into the development and implementation of science-based management efforts that promote the conservation of sea turtles throughout the southeastern U.S. Program scientists provide data to management and advisory bodies that develop management measures for sea turtles. SEFSC scientists provide critical information on population structure, abundance, and mortality of sea turtles to managers to use in developing plans to reduce commercial fisheries interactions. SEFSC collects data and develops analytical products that are used to support environmental planning for military operations and energy resource development and exploration.

Sea turtle species require both short-term and long-term assessment of populations and threats to their recovery to support effective management and conservation. Each of the major research goals below is directed at a particular parameter or set of parameters, but achieving each goal is ultimately required to develop a comprehensive understanding of the status of each stock and effectively maintain them as functioning elements of their ecosystems.

Our research program is focused on the following priorities:

Stock ID - A thorough understanding of population structure is necessary to define distribution boundaries, document migratory patterns, and accurately estimate abundance. Sea turtle populations are typically defined through genetic characterization. Collection of tissue samples for genetic analysis is conducted and directed by STP staff through diverse efforts. Population delineation is conducted in collaboration with the National Sea Turtle Genetics Laboratory (NMFS Southwest Fisheries Science Center), and recent efforts have yielded multi-stock analyses of numerous foraging populations. In addition, the STP supported a Turtle Expert Working Group (TEWG) to compile, analyze, and interpret loggerhead sea turtle genetic data throughout the Atlantic Ocean. The combined results of these efforts assist with delineating stock structure (e.g. Distinct Population Segments) and geographic distribution to investigate the proportional impacts of potential stressors on the different populations.

Abundance – Population abundance must be quantified to monitor trends, evaluate impacts of management actions, assess ecosystem level effects, and determine population status. Although extensive information is available regarding abundance of nesting females, both relative and absolute abundance data for in-water populations are lacking. SEFSC efforts to characterize abundance are focused on in-water life stages and include supporting and analyzing resulting capture-mark-recapture data. To increase the spatial and temporal scope of in-water abundance measurement, the SEFSC also conducts and participates in broad-scale aerial surveys along the U.S. Atlantic and Gulf coasts. Satellite tags with dive sensors are deployed on sea turtles within these areas to determine proportion of time spent at or near the water's surface, as well as movement and seasonal distribution, to calibrate turtles' availability to be detected during aerial surveys.

Vital rates & Life history - Information regarding survival rates, age structure, growth rates, stage durations, and sex ratios is integral to understanding population structure and dynamics. To obtain vital rate data, the SEFSC has estimated sea turtle survival probabilities at different life stages using diverse approaches, including satellite telemetry, and capture-mark-recapture.

The SEFSC investigates life history through observations of age, stage duration, and growth for turtles during in-water capture-mark-recapture studies in addition to data collected from other land-based sources of animals. In addition, analysis of skeletal growth marks (skeletochronology) in bones of stranded sea turtles has been refined and applied to investigate size-at-age relationships, life stage durations, age at maturation, and long-term trends in growth patterns for U.S., Mexican, and Brazilian populations. Recent integration of complementary chemical analyses (stable isotope, trace element) of bone tissue with skeletal growth increments is fostering research into associations of diet and habitat use with age and growth.

For all sea turtle species, sex is determined by nest incubation temperature, where environmental temperature fluctuations may result in varying sex ratios. However, a lack of distinguishing external characteristics for males and females during the hatchling and juvenile life stages impedes evaluation of sex ratio changes. Under this permit application, the SEFSC supports and

conducts studies of secondary (juvenile), and operational (breeding adult) sex ratios through laparoscopic examination of gonads, and development and application of methods to assign sex through measurement of blood testosterone levels. Cumulative results allow for evaluation of temporal trends in sex ratios and provide baseline data for assessing potential future changes resulting from effects of climate change on incubation temperatures.

Anthropogenic Impacts – To reduce potential population impacts from fishery interactions, bycatch mitigation technologies must be developed, instituted, and enforced. SEFSC research is instrumental in developing and refining modifications to fishing gear and practices that can reduce sea turtle bycatch without implementing closures. Behavioral, physiological, and morphological research involving wild turtles has made it possible to evaluate factors underlying interactions between turtles and fishing gear, allowing development of alternate approaches that may mitigate interactions.
Overlap between military activities and sea turtle habitats can also have potential, deleterious effects and must be assessed. The SEFSC employs telemetry (satellite and acoustic) to evaluate sea turtle distribution, relative abundance, and habitat use associated with military operations areas to facilitate planning to minimize negative impacts from military activity.

Baseline health data are needed to evaluate changes resulting from pollution and habitat modification that may produce individually sub-lethal, but potentially cumulative, effects on population health and status. SEFSC in-water have provided data to characterize baseline health parameters, which serve not only as a reference against which to measure changes in wild populations, but also inform treatment and release criteria for facilities that rehabilitate injured and sick sea turtles. Samples collected during in-water studies have allowed investigation of spatial and temporal trends in contaminant loads resulting from pollution and potential health effects.

Assessment Quality & Frequency – Modeling efforts must be conducted periodically to assess population status and incorporate updated population abundance, life history, vital rate, and demographic data. Refined modeling approaches can prioritize data collection, increase data utilization, and quantify effectiveness of management actions. The SEFSC has led and been integral to numerous assessments conducted by Turtle Expert Working Groups and Biological and Status Review Teams, collaborating with domestic and international federal and state agencies, academic institutions, and non-governmental organizations (NGOs) to assess population status for different species and identify data needs. Recently, as part of the NMFS Protected Species Assessment Tool Development and Application effort, SEFSC staff collaborated to build a spatially-explicit matrix model to simulate loggerhead sea turtle population dynamics, allowing evaluation of anthropogenic impacts and different management scenarios. SEFSC staff also participate in updating recovery plans under the ESA for all sea turtle species to incorporate recent data and evaluate population status. The products of these efforts are extensively assessed by working group participants and have been disseminated as internally-reviewed technical memoranda and peer reviewed publications, with a recent move toward review of the technical memoranda by the Center for Independent Experts.

Ecology – Knowledge of ecological function is needed to understand and mitigate effects of environmental stressors and anthropogenic influences on population health, viability and abundance, and to allow population assessment in an ecosystem context. Remote collection of sea turtle location data through telemetry (satellite, radio, and acoustic) enables the SEFSC to gather information regarding movements and habitat use. Incorporation of these data into models integrating spatially-explicit environmental information will provide insight into the factors influencing sea turtle distribution and movements. Indirect inference of habitat use through chemical signatures over time (stable isotopes, trace elements) in various sea turtle tissues allows the SEFSC to study the timing and factors underlying habitat shifts at different life stages. This approach makes it possible to characterize long-term diet trends for individuals and populations, which in turn enables evaluation of interactions between forage availability, diet preferences, and growth patterns.

The continued objectives of our research program are diverse, with the goal of improving the status of sea turtle assessments and meeting ESA recovery plan goals. Ultimately, our varied data collection efforts will improve NMFS' ability to answer questions on the proper management of these species and to understand sea turtles' role in the ecosystems they inhabit. Demographic parameters of most species of sea turtles remain relative unknowns, and a more rigorous estimation of these parameters would greatly improve management of these species. Survival, recruitment, utilization of habitat, and distribution in space and time can be investigated though the use of telemetry and mark-recapture studies. To properly assess populations, it is critical to obtain estimates of survival, recruitment, and emigration and immigration for neonates, juveniles and adults in both benthic and pelagic environments. There is also a continued need to determine the impact of fisheries and other anthropogenic effects on sea turtle species. Our research will substantially reduce the uncertainty in our understanding of survivorship, distribution, dispersal and behavior. Data from this program will substantially improve existing stock assessments, life history models and initiate development of our next generation assessments. Our data will highlight ways to reduce sea turtle interactions with numerous anthropogenic activities and will greatly improve our understanding of sea turtle life history and fishery impacts.

The SEFSC collects information on genetics, health status, contaminant load, growth, sex ratio, habitat use, survival, distribution and dispersal through our directed research efforts. Data on genetics, health, diet, contaminant load, and sex are determined via biopsy collection and blood sampling. Laparoscopy is used for sex determination, assessing reproductive status, and organ biopsies. Data on sex, reproduction, growth, and genetics are critical to understanding the basic biology of these species. Health status and contaminant load information allows for a better understanding of the impacts that environmental conditions have on turtles and the possible hazards of a compromised ecosystem. The need for long-term in-water indices of sea turtle abundance in coastal waters in order to provide critical stock assessment data not available through nesting beach monitoring alone was formally advocated twenty years ago (TEWG 1998) and more recently by the NRC (2010).

Some of the research questions and hypotheses we propose to continue to investigate include:

(1) Are populations of sea turtles stable and/or increasing, and do demographic and vital rate parameters remain stable? (2) Do coral reef systems with varying degrees of human use impact sea turtle use and residency time? (3) Is survival of non-fishery captured turtles higher than that of turtles incidentally captured in fisheries? (4) What proportion of time are sea turtles at the surface and visible to aerial surveys? (5) What are the habitat use, abundance and distribution of sea turtles in the Gulf of Mexico and U.S. Atlantic? (6) How does the foraging ecology of sea turtles change over time? (7) What are the baseline parameters of a 'healthy' population of sea turtles, and how has the health of the sea turtle populations changed over time?

Stock ID -We plan to continue to collect tissue samples to be used to refine the geographic boundaries of all sea turtle stocks on the foraging grounds under SEFSC jurisdiction.

Abundance -We plan to continue to estimate relative abundance with vessel-based studies to answer a variety of research questions, including using surface density estimates to scale catch rates during bycatch analyses and fishery closure evaluations. Data collected using satellite tags with depth and temperature recorders are used to refine density estimates by incorporating surfacing behavior into density calculations. The SEFSC also plans to use capture-mark-recapture to estimate local abundances at study sites within the region and monitor trends in catch rates.

Vital Rates & Life History -The SEFSC plans to use capture-mark-recapture data and pop-off satellite tags intended to detect mortality to estimate stage- and size-specific survival rates. We also plan to use capture mark-recapture to determine growth rates, stage durations, and age to maturation. In particular, turtle bones can be marked via an injection of tetracycline so that they can be used in future aging studies should the turtle strand dead. Stable isotope analysis of tissue samples collected during mark-recapture efforts have yielded information regarding the timing of ontogenetic habitat shifts for loggerheads and has the potential to do so for Kemp's ridleys, green turtles, and hawksbills as well. Finally, we plan to continue to investigate status and trends in population sex-ratios using testosterone titers and laparoscopic assessment.

Anthropogenic Impacts -The SEFSC intends to continue to investigate the effects of anthropogenic use of coral reefs on the habitat use and distribution of hawksbill turtles.

Through collaboration with other researchers, the SEFSC plans to continue to characterize sea turtle baseline health status to set criteria defining health parameters in free-ranging sea turtle populations to classify condition and disease states and also provide a reference against which to measure current status and future changes in population health. Tissue collection (blood sampling, biopsies) allows detection of deleterious biotic and abiotic factors (e.g., contaminants) and associated physiological impacts. This information can be used to help determine whether epizootics or health issues are causative factors in episodic unusual stranding events, especially when fishery interactions are unlikely to be the cause.

Ecosystem - The SEFSC intends to continue to use telemetry data (satellite, acoustic, and/or radio) to learn more about habitat use and movements of both foraging and migrating turtles. Telemetry data are used to provide information on the diving behavior of turtles, providing information on vertical habitat use. Analysis of stable isotope signatures of carbon and nitrogen in the tissues of sea turtles in conjunction with gastric lavage and fecal sampling will provide insight into trophic niche width, trends in foraging behavior, and the influence of foraging ecology on growth rates.

Summary of Recent Findings from Permitted Research

Since 2000, the research conducted by the SEFSC sea turtle program under previous NMFS permits has focused on addressing priorities described in the recovery plans for sea turtles and the protected species Stock Assessment Improvement Plan (SAIP). Furthermore, these efforts have provided data relevant to other NOAA missions and goals, such as the Ocean and Human Health Initiative, NMFS ESA listing decisions (e.g., NW loggerhead DPS), IUCN Marine Turtle Specialists Group (Wallace et al. 2010, 2011), the National Bycatch Strategy, and the Atlantic Strategy for Sea Turtles, with the ultimate goal of facilitating NOAA's recent move toward an Ecosystem Approach to Management. Some of our contributions and accomplishments (2000-2017) include:

Stock ID -We collect tissue samples throughout our programs to be used to refine the geographic boundaries of all sea turtle stocks on the foraging grounds under our jurisdiction, and to have a better understanding of what stocks are impacted by various human activities (e.g., fisheries, channel dredging). Recent publications and presentations included a multi-stock analysis of loggerheads (Caretta caretta) (Bass et al. 2004) and green turtles (Chelonia mydas) (Bass et al. 2006) on North Carolina foraging grounds and a similar analysis of loggerheads (LaCasella et al. 2013) and leatherbacks (Stewart et al. 2016) on the Grand Banks. Loggerhead genetic samples collected in NC 1998-2007 are being analyzed to investigate sex-linked trends in genetic composition of the juvenile foraging population. The SEFSC recently supported a Turtle Expert Working Group (TEWG) to examine loggerhead genetics throughout the Atlantic. Genetic data, in part, has been used to identify DPSs of loggerhead sea turtles and to identify Regional Management Units of most species worldwide (Wallace et al. 2010).

Abundance - Capture-mark-recapture studies, telemetry, and aerial surveys in North Carolina and trawl studies in collaboration with South Carolina Marine Resources Division (SCMRD) have allowed us to estimate local abundance, monitor trends in catch rates and movements, and investigate life histories (Avens et al. 2003; Braun-McNeill et al. 2008, 2010; Epperly et al. 2007; Goodman et al. 2007; Goodman Hall et al. 2013; Sasso et al. 2006, 2007; Schmid and Witzell 2006; Williard et al. 2017). Our estimates of loggerheads along the Atlantic seaboard (Richards et al. 2011) were used in the recent listing status decisions for the NW Atlantic DPS. Advances in telemetry and modeling have made it possible to better understand and predict distribution and movements of early juvenile sea turtles (Mansfield et al. 2012, 2013, 2014; Mansfield and Putman 2013; Putman and Mansfield 2015; Putman et al. 2013).

Life History - Capture-mark-recapture data and pop-off satellite telemetry have been used to estimate survival rates of oceanic and neritic loggerhead juveniles and to contribute capture-mark-recapture data to the loggerhead TEWG to estimate survival rates for nesting female loggerheads adults (Sasso and Epperly 2007; Sasso et al. 2006, 2011). Measurement of testosterone titers in the blood combined with laparoscopic assessment of sex for a subset of neritic juvenile turtles has indicated that the secondary sex ratios of juveniles in foraging areas are female-biased and that this bias in one juvenile loggerhead foraging population remained constant for a decade (Braun McNeill et al. 2007; 2016).

Anthropogenic Impacts -We also used satellite tagged loggerheads captured in the pelagic longline fishery on the Grand Banks to estimate post-hooking survival (Sasso and Epperly 2007). An ongoing project in the Florida Keys National Marine Sanctuary is assessing the effects of anthropogenic use of coral reefs on the habitat use and distribution of hawksbill turtles.

We have worked with research partners to characterize baseline health status that has been used to define health parameters in free-ranging loggerhead populations, to classify condition and disease states, and also to provide a reference against which to measure current status and future changes in population health (Kelly et al. 2015; Stamper et al. 2005; Valentine et al. 2007). Furthermore, this information can be used to help determine whether epizootics or health issues are causative factors in episodic unusual stranding events, especially when fishery interactions are unlikely to be the cause. Toxicological research has demonstrated the presence of many potentially deleterious contaminants, including organochlorines, polybrominated diphenyl ethers, and perfluorinated compounds, which have been linked to altered immune and reproductive function (Keller et al. 2004, 2005, 2006, 2012). Our in-water sampling program in North Carolina has provided samples over an extensive time frame so that temporal and spatial trends in contaminant loads can be investigated (O'Connell et al. 2010).

Assessments -In 2000, we published the report of the loggerhead and Kemp's ridley Turtle Expert Working Groups (TEWG 1998 and 2000). Soon after, we conducted a large assessment of loggerheads and leatherbacks to inform the biological opinion on the fishery for Atlantic highly migratory species. Since, we convened a TEWG for leatherbacks (2007) and one for loggerheads (2009). The reports from both were reviewed by the Center for Independent Experts and published as Technical Memoranda. Most recently, we completed a stochastic demographic analysis of loggerheads in support of the Gulf of Mexico reef fish bottom longline fishery Biological Opinion. Ecosystem -
Telemetry data have provided important insight into diving behaviors, habitat use and movements of foraging and migrating turtles (Avens et al. 2003; Braun-McNeill et al. 2010; Mansfield et al. 2009, 2014; Sasso et al. 2011). Analysis of stable isotope signatures of carbon and nitrogen in the tissues of neritic juvenile loggerhead sea turtles has provided insight into trophic niche width and the influence of foraging ecology on growth rates (Goodman Hall et al. 2015; McClellan et al. 2010; Wallace et al. 2009). Similar analyses for adult female loggerheads yielded information about the influence of foraging grounds on reproduction (Ceriani et al. 2015).

Take Number Rationale

In order to effectively develop, implement, and evaluate conservation policy, our research on sea turtles is directed at filling in data gaps and evaluating stochasticity. The SEFSC has identified several areas where research needs to be focused to provide more precise and accurate assessments of sea turtle populations in the Atlantic basin. In addition to the SEFSC's own research planning efforts, directed research to address specific questions is often mandated in biological opinions. Due to the SEFSC's responsibilities of providing stock assessments for sea turtle species in the Atlantic basin and responding to research mandates, the SEFSC requires authority to perform research across this entire area. As such, our research is programmatic in nature, and broad in scope. Flexibility is required to be responsive to emergent research needs and opportunistic platforms for collecting data. The research proposed in this application is a continuation of ongoing research under Permit No. 16733, building upon past efforts to increase our understanding of key demographic and vital rate parameters. Increased sample size will help to refine demographic parameters key to building robust population models. Our work complements other in-water studies that are being conducted along the eastern coast of North America and the Gulf of Mexico.

As is often the case with sea turtle studies, a statistically robust sample size is difficult to achieve given the scarcity of field encounters. We arrived at our requested sample sizes based on what we believe is a feasible number of turtles that could be captured annually given our previous experience and sampling effort, as well as minimum sample sizes required for our models and other analytical tools. We have a variety of specific research plans in place, and the sample size justification that follows highlights the current needs/plans.

For the purpose of internal management, our requested takes are organized into three take tables: Table 1.Abundance, Health Demographic and Behavior Studies in the North Atlantic, Gulf of Mexico and Caribbean Sea – Beaufort Laboratory; Table 2. Abundance, Health Demographic and Behavior Studies in the North Atlantic, Gulf of Mexico and Caribbean Sea – Miami Laboratory, and Table 3. Unintentional Mortality.

In Table 1 (Abundance, Health Demographic and Behavior Studies in the North Atlantic, Gulf of Mexico and Caribbean Sea – Beaufort Laboratory), we are requesting to sample annually: 555 loggerheads, 390 greens, 18 leatherbacks, 360 Kemp's ridleys, 21 hawksbills, 11 olive ridleys, and 18 unidentified hardshell/hybrids.

In Table 2 (Abundance, Health Demographic and Behavior Studies in the North Atlantic, Gulf of Mexico and Caribbean Sea – Miami Laboratory), we are requesting to sample or harass annually: 315 loggerheads, 395 greens, 227 leatherbacks, 215 Kemp's ridleys, 99 hawksbills, and 5 unidentified hardshell/hybrids.

In Table 3 associated with capture methods that have the potential for mortality due to entanglement and forced submergence, as well as the rare potential for mortality as a result of surgical procedures, we are requesting the lethal take over the life of the permit of 2 loggerheads, 2 Kemp's ridleys, 2 greens, 1 leatherback, 1 olive ridley, and 1 hawksbill over the life of the permit.

There will not be any intentional lethal take under this permit. We do not intend any unintentional mortality or serious injury as a result of the proposed activities, although there is a slight risk from surgical procedures such as laparoscopies due to the need for systemic anesthetic and penetration of the peritoneal wall in proximity to organs for visualization of the gonads, as well as from some capture methods [e.g., trawl nets, pound nets, entanglement nets]. While everything possible to mitigate the risk of serious injury or mortality will be done, occasionally circumstances beyond control can lead to mortality. For example, surgical procedures can have unforeseen complications (e.g., bleeding, infection, adverse reactions to drugs). Although every effort will be made to mitigate the risk of mortality due to capture as well (e.g., controlled mesh size, frequent net checks, tow time restrictions), there a potential risk of mortality from forced submergence with some capture types (e.g., trawls, pound nets, entanglement nets) remains. Steps taken in the past to mitigate the risk of mortality in the past include reduced mesh size and more frequent net checks. While these steps have been successful in preventing mortality, the risk of an anomaly occurring with the gear due to environmental conditions or other unforeseen factors cannot be completely eliminated.

Potential research plans are detailed below, but these are subject to change given the need to redirect activities to different regions, collaboration opportunities, and funding.
Very few data are available on endangered or threatened species population numbers; thus, power analyses often are not applicable, particularly when applied to studies that focus on the oceanic habitat. Because these animals are rare, we are limited by low field-encounter rates, which are dependent on sea state, weather, habitat and availability. Additional details on project specific

sample sizes are within project descriptions.

As the Agency responsible for management of endangered and threatened sea turtles in the marine environment, NMFS must perform directed research on these ESA-listed species. Monitoring and sampling these populations directly is essential to meeting these objectives. Our directed research efforts are intended to fill in data gaps identified by the SEFSC directly, through our Turtle Expert Working Group process, mandated in Biological Opinions published by the Agency, and recovery goals as stated in the recovery plans. There are no alternative non-ESA species that could serve as surrogates to provide the species-specific data required by NMFS. We are assessing survival, dive behavior, migratory behavior, and habitat use of sea turtles and cannot use surrogate species to assess such vital rates for a species.

Connection to Recovery Plans:
Species recovery requires a robust understanding of spatial distributions, population dynamics, and life stage-specific survival. To meet species recovery goals set forth by NMFS and USFWS, the status and condition of existing sea turtle stocks must be fully understood at each life history stage. Population models used to help manage Atlantic sea turtles rely heavily on data collected on the reproductive output, nest density and success of adult females on rookery beaches, but lack robust data on the early in-water and benthic juvenile life stages.

One objective of the loggerhead recovery plan (NMFS & USFWS 2008) is to "ensure the in-water abundance of juveniles in both neritic and oceanic habitats is increasing and is increasing at a greater rate than strandings of similar age classes." Similar wording can be found in the green and Kemp's ridley recovery plans, citing the importance of establishing a network of in-water sites in the Gulf of Mexico and the U.S. Atlantic to monitor populations (e.g., demographics and abundance) (NMFS & USFWS 1991; NMFS, USFWS & SEMARNAT 2011). These questions need to be addressed for hawksbills, leatherbacks, and olive ridleys as well (NMFS & USFWS 1992, 1993, 1998). As part of this research, we plan to gather additional data for loggerhead, green, hawksbill, leatherback, and Kemp's ridley sea turtles on sex ratios, growth rates, abundance, survival, foraging ecology and stock composition of the respective populations, thus contributing to the basic knowledge of the biology and ecology of the species. U.S. and international laws mandate the recovery of these imperiled animals, and our research addresses both data and technology gaps identified by NMFS, the USFWS, and the IUCN.

Providing accurate, unbiased seasonal abundance and spatial distribution data requires that availability bias is accounted for when interpreting aerial survey data. Availability bias is caused by animals being missed because they are not available to be detected if to animals dive so far below the surface they are not detected by an observer. Procedures to account for availability bias involve two steps. The first is to collect line transect data from two observation teams to account for perception bias. The second step (conducted under this permit), which is independent of the line transect survey, is to collect behavioral measurements such as dive times to estimate the probability that animals are available to the line transect survey observers. This is the only procedure that can address availability bias of long-diving species such as sea turtles. We address availability bias for sea turtles using satellite telemetry data. Additionally, these data provide the information needed for our study of habitat use and distribution.

Human activity is known to affect sea turtles via direct mortality from fishing, and through changes in behavior in response to human presence (such as fishing and diving) as well. Surveys will be conducted in the coral reef habitats (e.g., Florida Keys Marine Sanctuary) to assess the impacts of recreational activities on sea turtle use of coral reef habitat. We will conduct snorkeling surveys, tagging (e.g., satellite, flipper, PIT, sonic, acoustic tags) and tracking to assess sea turtle habitat use and residency time. This work also will benefit coral reefs by demonstrating the effects of differing levels of recreational use on hawksbill and green sea turtle habitat use and distribution, and the potential impacts of sea turtles on coral reef ecosystems. Sea turtles, particularly hawksbill and green sea turtles, impact coral reef ecosystems through selective grazing and predation, and direct disturbance to corals. Sea turtles are important components of the coral reef ecosystem and our research is the only ongoing study of sea turtles on coral reefs in the continental U.S. Sea turtles routinely interact with commercial fisheries and are in areas of oil/gas exploration and drilling, and our research is needed to understand the impacts of such anthropogenic activities. Little is known about the early life histories of Atlantic sea turtle species, and our integrative and novel methods will revolutionize sea turtle in-water work by improving life-history models, identifying nursery and development habitats, and providing an understanding of the dispersal and behavior of small oceanic sea turtles. We will identify sea turtle nursery areas and characterize the habitats used by these young animals. These findings will help determine locations of management concern (e.g., small and large scale areas where turtles are likely to be exposed to harmful anthropogenic interactions) and will bridge the gaps in our understanding of sea turtle life history. Results from our research will be broadly available at scientific meetings and in peer-reviewed journals and will address both the data and technology gaps identified by agency biologists and managers.

NMFS is mandated to provide for the recovery and protection of sea turtle species and as such is required to conduct this kind of research that will monitor these populations. Our directed research efforts are intended to fill in data gaps identified NMFS through our Turtle Expert Working Groups, the NRC assessment (NRC 2010), mandated in Biological Opinions published by the agency, Stock Assessment Improvement plans, and recovery goals as stated in the Recovery Plans. Our research will enable managers to do that as we will be monitoring many population variables, including vital rates, demographics, life history (growth rates and stage duration estimates), abundance, and their ecological roles (e.g., stable isotope analysis, habitat use, foraging).

We will continue to collaborate with other researchers. In the past, these collaborations have included the National Park Service, U.S Army Corps of Engineers, NEFSC, PIFSC, SWFSC, College of the Atlantic, New England Aquarium, Mystic Aquarium, MERR Institute, Riverhead Foundation for Marine Research and Preservation, Cornell University, Virginia Institute of Marine Sciences, N.C. State University College of Veterinary Medicine, North Carolina Department of Environment and Natural Resources, Duke University, The Karen Beasley Sea Turtle Rescue and Rehabilitation Center, University of North Carolina, College of Charleston, South Carolina Department of Natural Resources, Georgia Department of Natural Resources, Florida Fish and Wildlife Conservation Commission, University of Miami, University of Florida, University of South Florida, Florida Atlantic University, Florida Power and Light Company, SeaWorld of Florida, Marine Life Center of Juno Beach, Miami Seaquarium, Hidden Harbor Marine Environmental Project (The Turtle Hospital), Division of Fish and Wildlife-US Virgin Islands, Audubon Aquarium of the Americas, J.L. Scott Marine Education Center and Aquarium. We also will continue to compete for additional grants to further fund this research.

Description: The following project descriptions are planned or ongoing studies by the SEFSC at this time.

1) Cape Lookout Bight (Table 1)
2) Gulf Stream Surveys (Table 1)
3) North Carolina In-water Studies (Table 1)
4) Leatherback Studies (Table 2)
5) Biscayne National Park & Chassahowitzka National Wildlife Refuge (Table 2)
6) Florida Keys National Marine Sanctuary (Table 2)
7) Trawl captures in Gulf of Mexico (Table 2)
8) Programmatic In-water Studies (Table 2)

1) Cape Lookout Bight

Sampling Season/Project Duration:
Fieldwork is anticipated to occur throughout each year, with a greater concentration of effort in May when sea turtle occurrence is highest. During peak field activity at this site, we anticipate spending 2 - 3 weeks surveying 2 - 3 days/week, depending on weather conditions.

Project Purpose:
Hypotheses/Objectives and Justification

Annual NMFS SEFSC surveys conducted in Cape Lookout Bight (the Bight), NC, each May from 2014 - 2016, indicate that a large portion of the northern migratory sea turtle population along the US coast could be encountered and surveyed as they move through the area in the spring. In addition, because the Bight is a 'hot spot' where turtles (primarily juvenile and adult loggerheads and juvenile Kemp's ridleys) are predictably present in large numbers in a geographically-restricted area (~1.5 km2), this represents a unique opportunity to test alternative, novel survey approaches for characterizing sea turtle abundance.

Sample Size

Requested sample sizes for captures are based upon previous encounter rates from the pilot study. May capture rates during 2014, 2015, and 2016 ranged from 8 to 20 turtles/net km ? hr.

Project Description

Based on initial results, we propose to continue to conduct capture-mark-recapture sampling each year in the Bight to characterize abundance, species and size compositions, movements, and foraging ecology. UAS surveys, which do not require permitting, will be conducted in conjunction with mark-recapture to collect images during overflights and continue to test the utility of UAS surveys for detecting, counting, identifying, and estimating size. In addition, we plan to continue to test acoustic survey methods (for which a NMFS permit is not required) such as dual-frequency sonar (e.g., Didson/Aris acoustic imaging) as an alternative for detecting and counting sea turtles in the area. Finally, we propose to collect movement and dive data for loggerheads and Kemp's ridleys using satellite telemetry to assess availability for detection during UAS and acoustic surveys. Taken together, these data could be analyzed using approaches comparable to manned aerial line transect survey data and should allow calculation of species-specific relative yearly abundance and local density estimates. The mark-recapture effort is still in its early stages and additional recapture seasons are needed in order to determine whether the proportion of recaptures is sufficient to estimate population size using this approach.

Justification

Measurement of in-water sea turtle abundance has been identified by NMFS and the National Academy of Sciences as one of the most important data needs for improving sea turtle population estimates. Characterizing abundance trends, particularly with respect to stranding trends, is a requirement for NMFS to meet recovery objectives/criteria for all sea turtle species. In addition, abundance estimates are essential for assessing anthropogenic impacts, as they provide context for determining the population-scale effects of observed and inferred mortalities. Despite this significant data need, abundance estimates are difficult to obtain due in part to logistical challenges, high costs, and relatively low encounter rates often associated with conventional measurement methods. As a result, development of complementary and/or alternative survey methods to characterize sea turtle abundance is needed.

Methods

Capture

Each sampling day, a 100-m long, large-mesh (12-inch stretch) entanglement net will be deployed for 6 netting hours. Because previous sampling has demonstrated the potential for high interaction rates in this area, the net will be attended by two small vessels (center console, 17-25' length), each carrying a minimum of 4 crew. Indicator buoys will be attached at 5 m intervals along the top line and will be continuously monitored. If the buoys move, one of the two vessels will immediately check the net at that location to capture any entangled turtles and to dis-entangle and release any other organisms (e.g., sharks, rays). During that time, crew on the other vessel will continue to monitor the net for entanglements and respond if the indicator buoys move in a different location. Every 30 minutes, the net will be checked along its entire length, from top to bottom, to ensure that no turtles are entangled.

Each year captures have been conducted in this area, one turtle captured within a given sampling period has been recaptured within that same period. Turtles recaptured within 3 mos. of original capture would not be re-sampled and would be released as soon as possible.

Sampling

For all turtles captured, we will collect standard morphometric measurements to evaluate size distributions and condition; data to date indicate that the minimum size of turtle encountered would be 20 cm SCL for Kemp's ridleys, 25 cm SCL for greens, and 40 cm SCL for loggerheads. In addition, a blood sample will be taken for stable isotope analysis (SIA) to characterize overwintering habitat and diet, and a skin sample for genetic analysis to identify source populations. Each turtle will be Inconel and PIT tagged and photographed to identify individuals during subsequent encounters. An identifying visual mark (number or pattern) will also be applied on an individual scute using non-toxic paint or epoxy and will not cross suture lines between scutes. When funding allows, turtles will also be injected with a bone-marking dose of oxytetracycline; in the event that any bone-marked turtle later strands dead, bone samples can be collected and used to help inform skeletal growth mark analysis for age and growth studies.

Satellite tags equipped with dive depth sensors will be deployed on a subset of turtles for which surfacing data are not yet available (e.g., smaller juvenile loggerheads, Kemp's ridleys, greens), to characterize surfacing intervals/availability for detection in UAS images. As few data are available inshore for these species, the number of satellite tagged turtles will depend on how many tags are available for deployment due to funding levels and which sizes and species are captured in the early phases of this study. Ideally, UAS overflights and acoustic surveys will be conducted in conjunction with capture efforts. The captures will provide ground-truthing for species and size composition, as well as the opportunity to deploy tags for telemetry and collect trophic ecology data, and the UAS images and acoustic data will provide perspective on turtle abundance across a broader spatial scope.

High capture rates in the study area offer the opportunity to conduct additional behavioral and/or physiological studies of turtles encountered. For example, although recent research has shed some light on sea turtle auditory systems that could facilitate understanding of sea turtle interaction with their acoustic environment and possible use of acoustic deterrent devices (ADDs) for bycatch reduction (Bartol et al. 1999, Lavender et al. 2014, Piniak et al. 2016), additional data collection is needed. Auditory evoked potentials (AEPs) are electrical responses produced when the central nervous system is stimulated by sound. AEP techniques have historically been used as a non-invasive, quick method for determining hearing in non-communicative species (such as human babies, dolphins, manatees, fish, sharks, and sea turtles). We propose to use AEP measurement techniques on loggerhead, green, and Kemp's ridley sea turtles to measure the underwater hearing sensitivity of individuals of each species. Resulting audiograms from AEPs, along with those available in the literature and current, on-going research can then be used as a guide in generating and testing ADD signals during behavioral studies in laboratory and field conditions.

Take Action/Procedures Summary (list):
Capture (entanglement net); photograph/video; measure; blood sample; flipper tag; PIT tag; mark, carapace (temporary; Sample, tissue; Epibiota removal;; instrument, epoxy attachment (satellite, radio, acoustic); administer drugs (OTC bone marking); bycatch reduction experiments; captive, lab experiments

Project Location:
See Appendix I

2) Gulf Stream Surveys

Sampling Season/Project Duration:
The annual field season is anticipated to comprise 4 - 5 Gulf Stream surveys throughout the year, as weather allows.

Project Purpose:
Due to North Carolina's (NC) pivotal geographic location as a temperate-tropical transition zone, coastal morphology, and proximity to the Gulf Stream (GS), its associated waters host a dynamic complement of sea turtle populations. Of the five species occurring along the US Atlantic and Gulf coasts, all are present in NC during some portion of their lives. Although relative species composition may vary depending on life stage, in general order of most to least common, these are the loggerhead, green, Kemp's ridley, leatherback, and hawksbill (which exhibits only sporadic occurrence) sea turtles. More information is available to characterize nesting and inshore foraging populations because these habitats and the turtles utilizing them are more accessible to researchers. In addition, recent increased application of satellite telemetry for loggerheads has revealed high transitory use of NC shelf waters out to the western wall of the GS for post-nesting females migrating to northern foraging area, as well as juveniles and adults migrating in the fall from northern foraging areas to overwintering sites. In contrast, data regarding habitat use for any sea turtle species within the GS itself are comparatively sparse; 17 post-hatchling loggerhead sea turtles reared in captivity and released in Florida were observed to stay within GS waters as they transited north, beginning their oceanic juvenile migration (Mansfield et al., 2014). In addition, a small portion of juvenile loggerheads satellite tracked from inshore/nearshore waters during their fall migration have been observed to return to oceanic habitat via the GS (Mansfield et al., 2009; McClellan and Read, 2007) and concentrations of overwintering turtles have been observed along its western wall (Epperly et al., 1995). These results highlight the importance of NC shelf waters and the GS as migratory and overwintering habitat for sea turtles. However, this characterization is potentially limited, or even biased, because the satellite telemetry data are constrained to sea turtles tagged in other areas (i.e., nesting females and juveniles from inshore foraging areas) that then moved into the GS area for migratory or overwintering purposes. Although incidental observations indicate that turtles are present in NC shelf waters out to the GS during the summer foraging season, detailed information regarding seasonal presence, species and size compositions, and movements is lacking.

The North Carolina Renewable Ocean Energy Program (NCROEP) has identified evaluation of the Gulf Stream energy resource as one of its major research directions because of its potential to provide substantial baseload energy, primarily in the form of hydrokinetic energy. The feasibility of harnessing the GS energy resource depends on several factors, among them, the ecological and environmental impacts of GS energy development. To evaluate potential impacts of energy development on sea turtles in the GS region, SEFSC staff are collaborating with researchers at the NC Coastal Studies Institute to participate in resource assessment cruises in this region. We have conducted visual surveys and opportunistic captures using a large dip net when conditions allowed. Turtle sightings and captures were mapped (leatherbacks and juvenile and adult loggerheads), and captured turtles (4 post-hatchling loggerheads) were measured and skin biopsied when possible for stable isotope analysis.

Project Description

We propose to continue sea turtle surveys, captures, and tagging in the GS environment as part of the NCROEP (Figure 1). As tag availability and suitable animal size (>13 cm SCL for the smallest tags) allow, a subset of captured turtles for which the weight of tag and attachment materials does not exceed 5% of turtle weight will be satellite tagged to characterize movements and dive behavior in the region. Integration of these data with environmental information collected during other aspects of the resource surveys will offer insight into the factors underlying habitat use in this area. This approach will allow characterization of the sea turtle population occupying the study area outside previously described over-wintering and post-hatchling and/or seasonal migratory periods, which in turn will offer greater insight into any potential impacts to these turtles from hydrokinetic energy development in the region. Also, greater understanding of the oceanic juvenile life stage is integral to improving sea turtle population assessments and understanding population dynamics.

Methods

Vessel surveys

Vessel surveys will be carried out using 30-60' outboard or inboard vessels capable of safe transit between the NC coast and the GS offshore (typically ~40 km from shore, but transit distance may be up to 70 km). Once the vessel reaches the western boundary of the GS, observers will search for Sargassum lines and when found, the vessel will follow the frontal boundary while observers search for turtles from both an elevated tower and from the deck. When turtles are observed, a GPS waypoint will be taken and the turtle will be identified to species. The vessel may approach sighted turtles to distances of within 3' during capture attempts.

Capture

When turtles are observed, the vessel will slowly approach and crew on the deck will use a long-handled dip net to capture.

Sampling

We will collect standard morphometric measurements to evaluate size distributions and condition, and each turtle will be photographed and marked with a number or pattern on an individual scute of the carapace using non-toxic nail polish or marine epoxy. All turtles >10 cm SCL would be tissue biopsied for genetic and stable isotope analysis, all ?16 cm SCL would be PIT tagged (researchers are highly experienced in PIT tagging turtles <30 SCL, and the PIT tag will occupy no more than 20% of the muscle's total volume and 1/5 of its length), and all >30 cm SCL would also be Inconel tagged on the trailing edge of one or both rear flippers following evaluation of whether tissue present in the area is sufficient for tag retention. Turtles >25 cm SCL will also have blood samples collected for testosterone and stable isotope analysis to evaluate sex ratios and foraging ecology, respectively. The volume of blood sampled will not exceed 3 ml per 1 kg with a maximum of 4 needle insertion attempts (2 per side), and cumulative blood volume not to be exceeded within a 45-day period.

Satellite tagging

Satellite tags will be deployed on turtles as tag availability allows, and the subset of turtles to be tagged will be selected if the weight of tag and attachment materials does not exceed 5% of turtle weight. Depending on the size of the animal, either a solar powered or standard satellite transmitter will be used, but these turtles will only receive one satellite tag.

Solar powered satellite transmitters

A subset of small juvenile turtles >13 cm SCL and/or weighing ?300 g will have Microwave Telemetry PTT-100, or comparable tag from a different manufacturer, 9.5 g solar-powered satellite transmitters attached to the carapace using a flexible acrylic-silicone-neoprene attachment (Mansfield et al., 2012). Total weight of tag and attachment materials will comprise ?5% of each turtle's weight. To mitigate potential effects of increased hydrodynamic drag, tags will be positioned forward of the center of gravity and the silicone attachment will be tapered/smoothed to reduce drag (Jones et al., 2013). Following tagging, turtles will be released in the Gulf Stream within floating Sargassum mats.

Standard satellite transmitters

A different subset of larger juvenile and adult turtles captured in the Gulf Stream environment will be outfitted with standard satellite tags, with combined weight of transmitter and attachment materials not exceeding 5% of the turtle's body mass. To mitigate potential effects of increased hydrodynamic drag, tags will be positioned forward of the center of gravity and the silicone attachment will be tapered/smoothed to reduce drag (Jones et al., 2013).

Integration of tracking data yielded by the satellite tags with biological data for the turtles and environmental data collected during other components of the Gulf Stream resource survey effort will provide new insights into habitat use by small juvenile sea turtles in this geographic region, as well as potential impacts on life stages and species present by Gulf Stream energy development.

Take Action/Procedures Summary (list):

Count/survey /harass (vessel surveys); capture (dip net); Instrument, epoxy attachment (solar powered and standard satellite tags); measure; blood sample; flipper tag; PIT tag; mark, carapace (temporary); Sample, tissue; photograph/video; epibiota removal; Photograph/Video

Project Location:

See Figure 1. Location of Gulf Stream Surveys

3) North Carolina In-water Studies

Sampling Season/Project Duration:
Field season (April-November) would consist of daily, weekly or monthly trips, depending upon the gear used for turtle capture. For example, pound nets would be fished daily, for 1-3 weeks at a time; seines, trawls, and gill nets would be fished 1-2 times/wk throughout the field season, with each netting trip lasting 6 hrs.

Project Purpose:
Hypothesis/Objectives and Justification

North Carolina's inshore waters, particularly the Pamlico-Albemarle Estuarine Complex, serve as important foraging and developmental habitat for benthic immature loggerhead, green, and Kemp's ridley sea turtles (Epperly et al. 1995a, b); thus, in 1995, this area was established as an index area to monitor population-specific recovery. Long-term sampling of sea turtle populations

in this area has provided data on trends in catch rates, stock composition, sex ratios, growth rates, health, and diet that are integral to understanding population status and trends. This research gathers long-term data on sea turtle demographics and populations that complement other geographic sites gathering similar data so that an accurate assessment of sea turtles can be conducted.

In addition to population characterization studies, capture of sea turtles in North Carolina waters provides opportunities to investigate other aspects of biology and behavior (e.g., navigation and sensory biology) that can provide insight into possible effects of anthropogenic activities, as well as strategies for mitigation where effects are anticipated.

Historically, research about sea turtle hearing has been focused on the anatomy of the ear (Lenhardt et al., 1985) and only recently has research shed light on the auditory potential of sea turtles (Bartol et al 1999, Lavender et al. 2014, Piniak et al. 2016). Auditory evoked potentials (AEPs) are electrical responses produced when the central nervous system is stimulated by sound. AEP techniques have historically been used as a non-invasive, quick method for determining hearing in non-communicative species (such as human babies, dolphins, manatees, fish, sharks, and sea turtles). We propose to use AEP measurement techniques on loggerhead, green and Kemp's ridley sea turtles to ensure that they are able to detect an acoustic deterrent device (ADD) signal, thus enabling us to measure the underwater hearing sensitivity of individuals of each species. Resulting audiograms from AEPs, along with those available in literature and current on-going research (Bartol et al. 1999, Bartol & Ketten 2006, Ketten & Bartol 2006, Dow Piniak et al. 2012, Piniak 2012, Piniak et al. 2016) will be used as a guide in generating test ADD signals that can be implemented during behavioral studies.

Previous studies

As loggerheads have generally been the most abundant species in this study population, we have gathered quite a bit of data on this species. We documented increasing catch rates of loggerheads during the period 1995-2003 (Epperly et al. 2007) and estimated that 80% of captured individuals originated from the south Florida to North Carolina nesting population, 6% from Yucatan, Mexico, and 2% from other rookeries (Bass et al, 2004). The sex ratio of the population was determined to be 2F:1M (Braun McNeill et al. 2007), and this ratio did not change significantly over a decade-long period (McNeill et al., 2016). From growth rates of recaptured loggerheads, we determined that loggerheads take an average of 17 years to grow from 50 - 80 cm SCL, a substantial part of their juvenile neritic life stage (Braun McNeill et al. 2008). Juvenile loggerhead sea turtles exhibited site fidelity within foraging areas, often rapidly returning to capture sites following displacement (Avens et al. 2003a). In collaboration with colleagues from the North Carolina State University (NCSU) Center for Marine Science and Technology and Duke University, we gained insight on their baseline health (Kelly et al. 2015) and documented the presence of a pathogenic bacteria in their blood (Valentine et al. 2007), along with organochlorine contaminants in their tissues (Keller et al 2004, O'Connell et al. 2010, Keller et al. 2012). Finally, the use of stable isotopes has revealed that loggerhead diets are diverse, consisting mainly of blue crabs and whelks (Wallace et al. 2009), with individuals exhibiting long-term specialization (Goodman Hall et al., 2015). Because of the relatively lower numbers of green and Kemp's ridley turtles, we have not gathered as much information for these species. Capture rates did not change significantly during 1995-2003, but there was a noticeable increase in 2007-2009 (McNeill et al., In review). Due to this increase in both Kemp's ridley and green turtles, we are currently conducting research to estimate their sex ratios. Individual greens in the foraging aggregation during 1995-2003 mainly originated from the east coast of the United States (54%) and Mexico (27%) (Bass et al. 2006); however, other samples collected in later years have not yet been analyzed and may show temporal changes.

Captive behavioral studies demonstrated that juvenile loggerhead and green sea turtles displaced from capture sites without access to environmental information were able to determine their location using only local cues. During warmer months when turtles were resident in inshore waters, the turtles exhibited orientation toward their capture site, while in the fall when water temperatures decreased, the turtles oriented southward, as though beginning to migrate (Avens et al. 2004). Juvenile loggerheads were able to use either visual or magnetic cues to set and maintain a homeward direction of orientation, but were no longer able to do so when both cue types were disrupted (Avens et al. 2003b).

Publications yielded by research conducted under previous permits include the following:

Stock composition of foraging population of loggerhead and green sea turtles in NC (Bass et al 2004, 2006).

Estimates of loggerhead survival (Sasso et al. 2006, Braun McNeill et al 2007).

Loggerhead sex ratios (McNeill et al., 2007) and long-term trends (McNeill et al. 2016).

Estimates of loggerhead abundance (Sasso et al. 2007).

Trends in catch rates of loggerhead, green and Kemp's ridley sea turtles (Epperly et al. 2007, McNeill et al. In review).

Growth rates of loggerheads (Braun McNeill et al. 2008).

Diet composition of loggerheads (Wallace et al. 2009, McClellan et al. 2010) and long-term trends (Goodman Hall et al. 2015).

Contaminants in loggerheads (O'Connell et al. 2010, Keller et al. 2012).

Flipper and PIT tag retention rates for loggerheads (McNeill et al. 2013).

Photo-identification of individual loggerheads, greens, and Kemp's ridleys (Goodman Hall et al. 2013).

Characterization of overwintering habitat for juvenile green sea turtles (Williard et al. 2017).

Orientation and navigation of juvenile loggerhead and green turtles (Avens et al. 2003b, 2004).

Sample Size

Due to the comprehensive nature of the mark-recapture study in North Carolina, power analyses and robust statistical sample sizes are not applicable to this type of study. We determined our sample size/take numbers based on previous encounter rates and the expectation of similar effort levels in the future. Each year during 2009-2016, we captured a maximum of 75 loggerheads, 15 greens, and 15 Kemp's ridleys.

Project Description

We propose to continue to conduct sea turtle surveys, captures, tagging, and sample and data collection in this area using established methods and advanced technologies to build upon data collected for loggerhead, green, and Kemp's ridley sea turtles since the inception of this long-term study site. Abundance will be characterized through mark-recapture surveys. Turtles will be captured using pound, entanglement, trawl, and/or seine nets. Captured turtles will be identified to species and measured to determine size distributions and condition. Blood samples will be analyzed to measure testosterone, and a subset of turtles (healthy juveniles no smaller than 20 cm SCL), will undergo laparoscopic examination of the gonads to determine population sex ratios (not to exceed 10 individual turtles receiving a laparoscopic procedure per day). Stable isotope ratio measurements from blood, skin, and scute samples will provide information regarding foraging ecology and habitat use over different time scales, depending on tissue turnover times. Analyses of blood, lesion swab, and fecal samples will offer insight into health status and contaminant analyses of all tissue types will provide toxicological data. Genetic analysis of skin and/or blood samples will provide information about population structure, and integrating this information with testosterone/laparoscopy data will allow characterization of sex-linked trends in source population contributions to the foraging area. Tagging with flipper and PIT tags will ensure accurate identification of individuals, which in turn will provide information about site fidelity and movements as well as somatic growth rates for any recaptured turtles. Electronic tagging (satellite, radio, acoustic) will yield movement data on different scales to determine habitat requirements for the different species co-occurring in the study area. In addition, telemetry data will allow calculation of time spent at different depths for different species and life stages and therefore availability for detection using different abundance survey approaches. Behavioral

and physiological studies will provide information regarding sensory capabilities, how these may relate to bycatch of sea turtles in different fisheries, and possible gear modifications to reduce bycatch.

Justification

NMFS must know the status of the stocks to formulate recovery actions and monitor recovery. Historically, such information has come from nesting beach surveys; however, due to overall slow growth and late age at maturation, any population response to recovery actions would not be apparent for many years in nesting beach data. In contrast, the response of the in-water juvenile population can be detected much sooner and affords a more timely method of measuring the effectiveness of management actions taken to promote recovery. Both the National Academy of Sciences (2010) and the Turtle Expert Working Group (TEWG) (2009) recognize the importance of juvenile and other sea turtle life stages and recommend long-term, in-water indices of juvenile sea turtle abundance in coastal waters to determine relative abundance over time.

This research responds to the National Research Council's (2010) recommendation of "filling the large gaps in the available data" so that accurate assessments of sea turtle populations can be conducted. Furthermore, it addresses all NMFS Sea Turtle Assessment Research Themes: (A) Stock Identification, (B) Life History and Vital Rates, (C) Abundance, and (D) Anthropogenic Impacts. Long-term collection of demographic and population data will significantly increase understanding of the basic biology and ecology of loggerhead, green and Kemp's ridley sea turtles and facilitate identification and evaluation of conservation and management concerns by monitoring trends in the populations.

Methods

Summary

We will capture turtles during day trips in Back, Core, and Pamlico Sounds (Fig 2) from small, center-console boats (of 17-25' length) with outboard engines using gill nets, seines, trawls, or pound nets. All procedures conducted on turtles will follow research techniques and protocols as detailed in the SEFSC Sea Turtle Research Techniques Manual (NOAA TM-579). We will apply tags (Inconel, PIT, acoustic, radio, and satellite) to investigate site fidelity, habitat use, growth rates, and migratory movements. We will measure and sample (skin, scute, blood, lavage, fecal, cloacal, lesion, tears) each turtle to study population structure, foraging ecology, habitat use, health, and contaminant loads. For a subset of turtles (based on size, species and holding capacity of our lab), we will conduct behavioral and physiological experiments to investigate sensory capabilities, how these may relate to fisheries bycatch, and possible gear modifications to reduce sea turtle bycatch in fishing gear.

Capture
The area will be surveyed prior to setting gill nets or trawls to ensure that no marine mammals are within the study area (within a 100' radius of the research vessel or net). Rope attaching floats to nets will not have kinks or contain slack that could present an entanglement hazard. All non-target species will be released as quickly as possible to avoid any mortality. Gill nets will be checked every 30 min to avoid mortality of any captured animals. Pound nets allow animals to freely swim and do not normally gill animals so that mortality and injury is minimized. Pound nets and leaders will be checked every 24 hours. All live turtles encountered in pound nets will be immediately removed by holding the anterior and posterior sections of the carapace and gently setting the turtle into the bottom of the boat. The turtle will be manually restrained and confined within a section of the boat (i.e., either the small area in front of or behind the console) as it is being tagged and morphometrics and tissue samples are collected. These methods of capture will not adversely affect the physical or biological environment.

A study that compared the effects of capture in trawls and pound nets on the venous blood gases and lactates of loggerheads revealed that capture in a pound net can have a negative effect on blood gas, acid-base, and lactate status as well as the respiratory physiology of loggerheads (Harms et al. 2003). The effects of the confinement and forced submergence on live turtles are expected to dissipate within a day (Stabenau and Vietti 1999). Although a number of fish species will also be captured in pound nets, since pound nets are a stationary gear that entrap animals while still allowing them to swim and breathe, we expect little (< 1%) or no mortality associated with this gear. There may be some fish bycatch mortality when conducting trawls, but efforts will be made to release all animals as carefully and quickly as possible to avoid any mortality. In the event that we capture an injured or ill sea turtle, we will follow state and federal sea turtle

stranding reporting protocols and report the turtle to the nearest permitted state sea turtle stranding network rehabilitation or veterinary group. Treatment for comatose turtles will be followed if necessary.

Previous data collection in this study area has indicated that only loggerhead, green, and Kemp's ridley sea turtles will be encountered, although it is possible that individual leatherback, hawksbill, and/or olive ridleys might occur rarely and sporadically. Various measurements will be taken for all turtles captured (e.g., carapace length, width, body depth, tail length, etc), to track growth rates and size distributions and to determine sex. Upon first capture for each turtle, flipper tags will be applied and a PIT tag injected to identify individuals over time. If turtles are later recaptured having lost one or both flipper tags and/or their PIT tag, the missing tag/s will be replaced. Also upon first capture for each turtle, annually, a blood sample will be collected for testosterone analysis (sex determination) and stable isotope analysis (short-term information regarding trophic ecology). Upon first capture for each turtle, skin biopsies will also be collected for genetic analysis and stable isotope analysis (longer-term information regarding foraging location and trophic ecology). Also annually, a subset of 10 of each species each year may be lavaged and/or have blood, biopsies (gonad, liver, kidney, spleen, mesenteric fat, lesions), lesion, nasal, and eye swabs or keratin collected in conjunction with laparoscopic examination of gonads to investigate population health, contaminant exposure and sex ratios. In addition, a subset of 10 of each species each year may be instrumented with radio, satellite, acoustic, and/or PAT tags to record broad- and fine-scale movements, to characterize migration patterns, site fidelity, and habitat requirements. Finally, a subset of 20 turtles of each species each year may be transported to a laboratory setting for captive physiological and behavioral experiments. It is not anticipated that individual turtles would undergo laparoscopy, electronic tagging, and/or behavioral experiments during the same captive interval. However, given the high level of long-term recapture rates for turtles in this study area, it is possible that individual turtles (possibly 2 of each species for loggerheads, green turtles, and Kemp's ridleys) might undergo two or all of these procedures over the course of the permit.

Bycatch Deterrent Devices

Understanding how animals perceive and respond to sensory cues can guide the development of bycatch reduction technologies (BRTs). The goal of this research is to develop BRTs that reduce sea turtle bycatch, maintain target fish catch rates and market value, and are readily adoptable into a variety of coastal fisheries. We plan to use knowledge of two sensory cues, acoustic (or auditory) and visual, to develop and test potential bycatch deterrent devices.

Acoustic
Acoustic deterrent devices (ADDs) are low-intensity sound sources designed to deter animals from potentially harmful fishing gear. Although ADDs have been successfully used to reduce some species of marine mammal bycatch, we have only recently begun evaluating these devices for use with sea turtles. Recent studies have shown that sea turtles detect low-frequency underwater stimuli between 50-2,000Hz (Bartol et al. 1999, Bartol & Ketten 2006, Lavender et al. 2014, Martin et al. 2012, Piniak 2012, Piniak et al. 2016); however the hearing sensitivity of many species and size classes has not been examined. To develop appropriate ADD signals (frequency and sound pressure level in maximum sensitivity range) and ensure that sea turtles are able to detect ADD signals, it is necessary to measure the underwater hearing sensitivity of individuals of each species. The hearing sensitivity of several turtles will be measured before ADD tank or field trials using auditory evoked potential (AEP) measurement techniques.

Auditory Evoked Potentials:
AEPs are electrical responses produced when the central nervous system is stimulated by sound. AEP techniques have historically been used as a non-invasive, quick method for determining hearing in non-communicative organisms (such as human babies, dolphins, manatees, fish, sharks, and sea turtles). The methodology used to measure hearing sensitivity will follow those described by Dow Piniak et al. (2012, 2016) and Harms et al. (2009, 2014) developed when measuring hearing in juvenile green sea turtles and hatchling leatherback sea turtles. Juvenile loggerhead, green, and Kemp's ridley sea turtles will be caught using authorized capture methods and transported to the laboratory where captive studies will be conducted either by vessel or in a covered vehicle. Individual turtles will be isolated in padded containers and covered with towels soaked in seawater. Trials will be conducted at either the 1) NOAA Beaufort Laboratory; 2) Duke Marine Laboratory; 3) University of North Carolina-Chapel Hill Institute of Marine Sciences, or 4) North Carolina State University Center for Marine Science and Technology. Location of trials and holding will be determined by availability and suitability of tanks for conducting physiological and behavioral experiments and for meeting holding conditions as specified by USFWS. All transport times will be < 2 hrs.

A Tucker-Davis Technologies Workstation and SigGen and BioSig software run by a laptop computer will generate sound stimuli through the underwater speaker and record evoked potentials

from a three-electrode array. Needle electrodes (27 ga) will be inserted subdermally (just under the scute/skin 2-4 mm), one at the top of the head (recording electrode) and one in the deltoid muscle in the shoulder (reference electrode). A third electrode will be placed in the seawater as a ground. The system and acoustic field will be calibrated with a hydrophone at the location of the turtle's head when the turtle is not present and background noise will be measured to ensure that thresholds are not masked by background noise. Turtles will be isolated from vibrations, lightly restrained by wrapping them with stretchy lycra material to prevent swimming movement (as myogenic artifact can mask AEPs), and placed completely submerged at a depth that still allows them to lift their heads to the surface to breathe normally (at least 10 cm beneath the surface to move away the air-water interface where the acoustic field can be unpredictable). Turtles will be raised manually to the surface at intervals determined by pre-test observations of normal breath cycles. An amplified speaker positioned 60 cm distant from the turtle's ear will present acoustic stimuli as 100 ms tones ramped with a 20 ms rise-fall time, starting at the highest level of 142 dB re: 1 µPa-rms. Measurements will be made at the following frequencies: 50, 100, 200, 300, 400, 600, 800, 1600, and 3200 Hz (with additional frequencies if needed) at decreasing amplitudes (each step 6 dB) until an AEP response can no longer be detected. AEPs will also be measured in response to a broadband click stimulus. The system will be paused when the turtle lifts its head or moves in any way so that all records are obtained from the turtles with its head in the same location in the acoustic field. Artifact rejection will also be used to reject sweeps containing electrical noise if the turtle moves its head during data acquisition. If at any point the turtle seems stressed (excessive movement or breathing) tests will be terminated. Experiments will not exceed 75 min. Retention of wild-caught sea turtles in captivity for approximately 48 hours spread over 3 calendar days is requested to accommodate logistical considerations. Capture would occur on the first day, with turtles being placed in tanks in captivity during the afternoon and then allowed to acclimate prior to initiating trials. AEP trials would be conducted on the second day and after trial completion, turtles
would be observed for a period of hours to ensure that they are behaving normally. To allow time to transport the turtles back to their capture location, sometimes several hours' travel away from the captive setting, release would occur as soon as possible on the third day.

Tank Experiments of Potential ADDs:
The resulting audiograms, along with those available in literature and current ongoing research (Bartol et al. 1999, Bartol and Ketten 2006, Martin et al. 2012, Dow Piniak et al. 2012, Piniak 2012, Lavender et al. 2014, Piniak et al. 2016) will be used as a guide in generating potential test ADD signals in free-swimming tank experiments. These will include several combinations of frequency, intensity (not greater than 140 dB re: 1 µPa-rms, and presentation rate. All sound signals will be generated using an amplified underwater speaker in a tank where an individual turtle will be swimming freely. For tank experiments, prior to testing, the sound field in all areas of each test tank will be measured. The effectiveness of each frequency, intensity, and presentation rate combination will be determined by comparing the turtle's behavior during a 30-minute baseline period prior to each test, a 30-minute test period, and a 30-minute recovery period immediately following each test trial. Behavioral responses of juvenile loggerhead, green, and Kemp's ridley sea turtles to sound stimuli that might be used in potential ADDs will be measured using an overhead video camera and, when available, a ROTAG datalogger device or newest version of the ROTAG, the Audio-Motion Datalogging tag (AMX). The ROTAG and AMX tags are low-power dataloggers which are attached to the turtle's carapace and incorporate a three-axis accelerometer gyroscope and magnetometer to record the turtle's pitch, roll, and heading; a pressure sensor to record turtle depth; a hydrophone to record the turtle's received underwater acoustic sound field; a temperature gauge; and two VHF radio telemetry transmitters and antennas for tag and turtle tracking (www.loggerheadinstruments.com; Tyson et al. 2017). Prior to testing, the sound field in all areas of each tank will be measured. As turtles will be freely swimming we will document the distance between the turtle and the speaker, location in the sound field, presence or absence of startle response, activity, orientation, and breathing rates, and use these data to determine if the turtles were deterred from the speaker. When possible, we will test individuals multiple times over a period of 24 hours to determine if sea turtles habituate or, conversely, become sensitized to the sounds presented.

Field-testing of ADDs in Fisheries:
To investigate use of acoustic cues as potential bycatch reduction devices in practice, active or inactive ADDs will be submerged on either netting or supporting stakes of pound nets or suspended from gillnets. ADDs will generate alternating 200 and 400 and 300 and 500Hz tones, 1 second in length, presented every 10 seconds at no greater than 140 dB re: 1?Pa at 1m. We will alternate between experimental and control trials for individual nets, and we will check nets and record and process catch each day.

Visual
The visual sensitivities of several sea turtle species of sea turtle have been well examined. Physiological (electroretinograms) and behavioral studies indicate that green, loggerhead, and leatherback sea turtles are sensitive to light over a large spectral range from ultraviolet (<400nm) to red (~650-700nm), and it is believed that visual cues play an important role in sea turtle foraging behavior and orientation (Moein Bartol & Musick 2003, Fritsches & Warrant 2013).

Field testing of LED Net Illumination in Fisheries:
In addition to ADDs, recently developed visually-based net illumination bycatch reduction devices (Electralume or Centro Power Light Model LEDs) have been shown to reduce sea turtle bycatch by up to 65% with no adverse effect on target fish catch rates of revenue in Mexican and Peruvian gillnet fisheries (Wang et al. 2010, 2013, Ortiz et al. 2016). To examine impacts of LEDs on fish and sea turtle catch, net gear will be fished according to permit authorization, alternating control and experimental (ADD or LED) treatments and catch rates between treatments will be compared.
Number of times known individuals will be intentionally taken in a year as driven by objectives and study design.
We anticipate recapturing an average of 3 individuals of each species each year (based on previous recapture rates), which would not be re-sampled for any procedure conducted during initial capture, except for morphometrics. Each turtle would be released as soon as possible. Some animals will only get a subset of procedures. We will make the decision of which procedure to conduct on which turtle based on the objectives of specific studies encompassed by the broader scope of the research. For example, if characterization of adult male loggerhead migratory pathways is determined to be a SEFSC sea turtle program priority, then only adult male loggerheads will be equipped with a satellite transmitter prior to release. If continuing to estimate population sex ratios for green and Kemp's ridley turtles is determined to be a priority, then only these species will be returned to the laboratory for laparoscopies.

Take Action/Procedures Summary (list):
Capture (gill nets, seines, trawls, or pound nets); Captive, lab experiments; Bycatch reduction experiments; Captive, lab experiments; transport; laparoscopy; Epibiota removal; Count/survey (harass); Instrument, epoxy attachment (e.g., satellite tag, VHF tag, acoustic tag); Measure; Photograph/Video; Sample, blood, fat, organ, scute, cloacal, fecal, muscle, nasal, tears, tissue; Lavage, gastric; Mark, carapace (temporary); weigh

Project Location:

See Fig. 2. Location of North Carolina In-water Studies

4) Leatherback Studies

Sampling Season/Project Duration:

Leatherback surveys will be conducted in the Gulf of Mexico and Atlantic Ocean for up to 8 weeks total per year. Sampling will be focused in late summer/early fall in the Gulf and late Spring/early summer in the Atlantic. We can capture and tag up to 6 turtles per day when turtles are abundant in an area and the weather conditions and sea state permit capture.

Project Purpose:
NMFS needs to provide accurate, unbiased data on sea turtles. This requires aerial surveys and independent capture surveys for the collection of behavioral measurements, such as dive times and satellite telemetry data, to estimate the probability that animals are available to the aerial survey observers. Additionally, these data provide the information needed for our study of survival, habitat use and distribution.

Project Description

Leatherbacks will be captured using the direct capture method (Asper 1975). The direct capture methodology utilizes a hoop net to capture free-swimming leatherbacks and has been employed by NMFS staff in the Pacific Ocean and other researchers in the US and Canadian Atlantic. Turtles will be located with the aid of a UAS (for less than 5 min., but occasionally pursuit will occur for >5 min.) with live video feed operated from the capture vessel (generally < 10m) with a bow pulpit or fixed-wing aircraft with radio communication to the capture vessel. A breakaway hoop net will be wide enough to fit easily over a turtle the size of a leatherback with front flippers loosely held at its side. One of our crew, previously trained in leatherback direct capture techniques, will be positioned on the bow pulpit, ready to guide the hoop net (fitted to a long guiding pole) over the turtle. The hoop net will be fitted with breakaway stays to attach the net, which will be pursed over the turtle. The turtle will be quickly brought aboard a floating inflatable platform for satellite tag attachment. The turtle will be taken out of the net, quickly examined and secured so

that its limbs are held close to its body to prevent injuries to the turtle and personnel but breathing will be unrestricted.

Once on board, turtles will be measured (we only anticipate encountering adult turtles based on previous research), have biopsies taken, satellite tagged, and flipper and PIT tagged following procedures described in the SEFSC Sea Turtle Techniques Manual (http://www.sefsc.noaa.gov/PDFdocs/TM_579_SEFSC_STRTM.pdf). Blood may be drawn if needed for health assessments and stable isotope analysis, but not as part of the standard sampling protocol for all individuals. Turtles will be measured and tissue biopsies will be taken for genetic analysis. Tissue samples will be sent to the NMFS Sea Turtle Genetic Lab at the Southwest Fisheries Science Center in La Jolla, CA for genetic analysis to determine nesting beach origin with both mitochondrial and microsatellite DNA. We will deploy Data-Collecting GPS Argos Satellite tags. During the deployment, GPS location, depth and temperature data will be collected, analyzed, summarized, and compressed for transmission through the Argos satellites. We will directly attach a satellite tag to the medial ridge of the turtle's carapace (see SEFSC Sea Turtle Techniques Manual). The animal will be released immediately following completion of sampling procedures and transmitter attachment. All efforts will be made to assure that turtles, once landed, are in good physical condition before being tagged and returned to the sea.

Sample Size

Requested leatherback sample sizes are based on logistical feasibility, as so few in-water data exist on this species in these areas and the ability to make meaningful conclusions to assist management with their information needs. Satellite tagging sample sizes were determined based on previous effort, required number of samples to make sound conclusions from the data (e.g., survival analysis) and realistic funding. Survival analysis should have a sample size of 20 or greater in a known fate analysis, ideally on an annual basis in order to assess fluctuations in annual survival rates.

Turtles would only be captured once, with up to 50 total animals captured and satellite tagged per year (25 GOM, 25 Atlantic). And, up to 50 leatherbacks may be observed/pursued > 5 min. during vessel surveys but not captured during unsuccessful capture attempts. Up to 50 leatherbacks may be observed/pursued > 5 min. during aerial surveys but not captured. It's possible that up to 25 leatherbacks captured under other authority (e.g., Pelagic Longline Fishery bycatch) could be satellite tagged as well if a vessel were capable of boarding turtles. These fishery captured turtles would be used to estimate post-hooking survival rates along with assessing post-hooking behavior and movements. For this fishery's biological opinion see: http://sero.nmfs.noaa.gov/protected_resources/section_7/freq_biop/documents/fisheries_bo/hms_bo_6_01_04.pdf.

Take Action/Procedures Summary (list): hoop net capture, measure, Sample, tissue; Instrument, drill carapace attachment via caudal peduncle or medial ridge, flipper and PIT tag; Photograph/Video; Sample, blood; Count/survey /Harass (vessel and aerial surveys - pursue without capture > 5 min.)

Project Location: Gulf of Mexico & Atlantic Ocean

5) Biscayne National Park (NP) & Chassahowitzka National Wildlife Refuge (NWR)

Sampling Season/Project Duration: Surveys will be conducted throughout the year in Biscayne NP and two weeks per year at Chassahowtizka NWR.

Project Description:

Visual vessel surveys will be conducted in Chassahowitzka and in Biscayne NP in order to estimate abundance and estimate demographic parameters (survival, recruitment, emigration, immigration). In some cases, turtles will be pursued for a maximum of 5 minutes but not captured if they escape. Additionally, Sea turtles will be hand captured, flipper- and PIT-tagged, photographed, measured, and biologically sampled for genetic and stable isotope analysis. Turtles will be captured by hand (see hand capture methods) or with a net (dip, hoop, strike gill net, or cast net). Once at the surface, the onboard crew will lift the turtle over the gunwale with aid of the diver in the water. Upon boarding, each turtle will be kept moist and shaded to maintain temperatures similar to those at capture. Turtles will be handled, sampled and satellite tagged in accordance with the protocols described in the SEFSC Research Techniques Manual.

The biopsies will be taken from the trailing edge of the rear flipper using a sterile biopsy punch. The tag data will allow for mark-recapture analysis after several sampling events to estimate abundance. Turtles in both locations will be satellite tagged to assess habitat use and dive behavior.

Upon recapture, turtles will have their tag numbers recorded, have flipper tags reapplied if necessary, photographed and measured prior to release. If recapture is greater than 1 year since the initial capture, turtles may be biopsied again to investigate changes in stable isotopes over time. All turtles will be released alive following procession with standard tagging and measuring protocols. Mark-recapture data will be used to estimate abundance using a closed population model in Program MARK initially with open models among sampling sessions explored depending on the quality of the data.

Sample Size

Sample sizes for surveys were determined based on previous efforts and logistic feasibility. Satellite tagging sample sizes were determined based on previous effort, required number of samples to make sound conclusions from the data (e.g., survival analysis) and realistic funding. Minimum sample sizes of 5-10 per species are necessary to make conclusions about habitat use.

Up to 50 green turtles, 10 hawksbills, 10 Kemp's ridley and 50 loggerheads will be captured, measured, flipper and PIT tagged, biopsied, have blood drawn and released in Biscayne National Park annually. Up to 20 additional green turtles, 5 hawksbills, 5 Kemp's ridley and 20 loggerheads will be captured, measured, flipper and PIT tagged, biopsied, have blood drawn, satellite or sonic tagged using the direct attachment epoxy method and released in Biscayne National Park annually. Up to 50 green, 25 loggerhead, and 10 Kemp's ridley turtles could be pursued > 5 min. without capture during vessel surveys and capture efforts.

Up to 50 green turtles, 5 hawksbills, 50 Kemp's ridley and 25 loggerheads will be captured, measured, flipper and PIT tagged, biopsied, have blood drawn and released in Chassahowitzka annually. Up to 20 green turtles, 2 hawksbills, 20 Kemp's ridley and 20 loggerheads will be captured, measured, flipper and PIT tagged, biopsied, have blood drawn, satellite tagged using the direct attachment epoxy method, and released in Chassahowitzka annually. Up to 50 green, 25 loggerhead, and 10 Kemp's ridley turtles could be pursued > 5 min. without capture during vessel surveys and capture efforts.

Take Action/Procedures Summary (list): hand capture, net capture (dip, hoop, and cast nets); photograph, measure, flipper and PIT tag, tissue skin biopsy, blood sample, Instrument, epoxy attachment (e.g., satellite tag, VHF tag, sonic tag); Instrument, drilled attachment (sonic tag); Count/survey /Harass (vessel surveys)

Project Location: Chassahowitzka National Wildlife Refuge and Biscayne National Park

6) Florida Keys National Marine Sanctuary

Sampling Season/Project Duration: Year round/ongoing

Project Purpose:

To assess genetics by tissue sampling to inform where resident hawksbills originate from, as well as relatedness to other foraging populations in the Caribbean and Florida using stable isotopes.

Project Description

Surveys will be conducted in the Florida Keys Marine Sanctuary to assess the impacts of recreational activities on sea turtle use of coral reef habitat. We will conduct vessel surveys over

seagrass habitat and snorkeling surveys on coral reefs (with no impact to the benthic habitat) and satellite tag and track turtles to assess sea turtle habitat use and residency time using methods detailed in the SEFSC Research Techniques Manual. This work also will benefit coral reefs by demonstrating the effects of differing levels of recreational use on hawksbill and green sea turtle habitat use and distribution, and the potential impacts of sea turtles on coral reef ecosystems.

Sample Size

Sample sizes for surveys were determined based on previous efforts and logistic feasibility. Satellite tagging sample sizes were determined based on previous effort, required number of samples to make sound conclusions from the data (e.g. survival analysis) and realistic funding. Minimum sample sizes of 5-10 annually per species are necessary to make conclusions about habitat use.

Up to 50 greens, 25 hawksbills, 10 Kemp's ridleys and 20 loggerheads will be captured, measured, flipper and PIT tagged, biopsied for genetics and stable isotope analysis, have blood drawn for health assessments and stable isotope analysis, and released in the Florida Keys annually. Up to 10 greens, 10 hawksbills, 5 Kemp's ridleys and 10 loggerheads will be captured, measured, flipper and PIT tagged, biopsied, have blood drawn, satellite tagged, and released in the Florida Keys annually. Up to 5 hawksbills could be pursued > 5 minutes without capture during survey and capture efforts.

Take Action/Procedures Summary (list): hand capture, measure, Photograph/Video, flipper and PIT tag, skin tissue biopsy, blood sample, Instrument, epoxy attachment (e.g., satellite tag, VHF tag); Count/survey /Harass (vessel surveys)

Project Location: Florida Keys National Marine Sanctuary

7) Trawl captures in Gulf of Mexico

Sampling Season/Project Duration

March - October annually, with a focus on March - June.

Project Purpose: Hypothesis/Objectives and Justification

This project will assess potential factors contributing to recurring high seasonal marine turtle stranding levels occurring in the Mississippi Sound and surrounding waters. The project will identify habitat usage and movements describing patterns, if any, to try to reduce anthropogenic impacts, paying particular attention to areas where turtles may congregate. Satellite tracking these small Kemp's ridleys will provide valuable information on movements and habitat usage of turtles temporally and spatially which could provide insights into anthropogenic impacts such as fisheries that are likely occurring in the area during spring, a time of recurring seasonal elevated strandings. We will also look at regional fisheries landings data to determine commercial fishing activities and relate these with the turtles' movements to investigate potential anthropogenic impacts. Sea turtle isotopic composition from skin biopsy samples will be compared amongst turtles and with potential prey items found within the foraging area to determine the turtles' trophic ecology. These values will be compared to gut contents (e.g., fish) of stranded turtles obtained via the STSSN in the area, either supporting or rejecting the hypothesis that these juvenile turtles are normally foraging on fish.

Project Description

Trawl gear similar to that used by the commercial shrimp industry without the use of a Turtle Excluder Device (TED) will be used to capture turtles. Strict tow times will be followed. Upon boarding, each turtle will be kept moist and shaded to maintain temperatures similar to those at capture. Turtles will be handled, sampled and tagged in accordance with the protocols described in the SEFSC Research Techniques Manual.

Sample Size

The sample size was determined based on previous research in the area using trawling as a capture method and available funding. We are requesting to capture annually with trawl gear in the Gulf of Mexico 10 greens, 2 hawksbills, 10 Kemp's ridleys, 10 loggerheads, and 2 leatherbacks.

Take Action/Procedures Summary (list): trawl capture, blood sample; measure; flipper tag; PIT tag; skin biopsy; lavage; fecal sample collection (opportunistic); electronic tag (satellite, epoxy)

Project Location: Gulf of Mexico

8) Programmatic In-water Studies

Sampling Season/Project Duration: Year-round

Project Purpose:

As the Agency charged with managing in-water sea turtle populations, NMFS often needs to respond to unforeseen research needs/collaborative opportunities, as well as assessing the impacts of commercial fisheries and understanding post-interaction injury and mortality. Our program's research objectives include stock/population identification, refining life history/vital rates, assessing abundance, and assessing impacts from natural and anthropogenic disruptions. It is necessary for the SEFSC to have the ability to perform standard research methods (measure, weigh, PIT and flipper tag, biopsy, blood sample, and electronic tag) on sea turtles to provide information to manage these species.

Ultimately, our varied data collection efforts will improve NMFS' ability to answer questions on the proper management of these species and to understand sea turtles' role in the ecosystems they inhabit. Demographic parameters of most species of sea turtles are relative unknowns, and a more rigorous estimation of these parameters would greatly improve management of these species. Survival, recruitment, utilization of habitat, and distribution in space and time can be investigated through the use of satellite tags and mark-recapture studies. To properly assess populations, it is critical to obtain estimates of survival, recruitment, and emigration and immigration for neonates, juveniles and adults in the benthic and pelagic environments they utilize. There is also a need to determine the impact of fisheries and other anthropogenic effects on sea turtle species. Our research will substantially reduce the uncertainty in our understanding of survivorship, distribution, dispersal and behavior. Data from this program will substantially improve existing stock assessments, life history models and initiate development of our next generation assessments. Our data will highlight ways to reduce sea turtle interactions with numerous anthropogenic activities and will greatly improve our understanding of sea turtle life history and fishery impacts.

Sample Size

Up to 50 green turtles, 20 hawksbills, 50 Kemp's ridley, and 50 loggerheads will be captured, measured, flipper and PIT tagged, biopsied, have blood drawn and released opportunistically annually. Up to 10 green turtles, 5 hawksbills, 10 Kemp's ridley, and 10 loggerheads will be captured, measured, flipper and PIT tagged, biopsied, have blood drawn, satellite tagged, and released annually. Up to 25 green turtles, 10 hawksbills, 25 Kemp's ridley, 25 leatherbacks, and 50 loggerheads will be measured, flipper and PIT tagged, biopsied, have blood drawn, satellite tagged, and released after being legally captured under another authority (e.g., commercial fisheries, other Section 10 permits) annually.

Take Action/Procedures Summary (list):
Capture (all methods), capture under other authority, measure, weigh, PIT and flipper tag, tissue skin biopsy, blood sample; Instrument, epoxy attachment (e.g., satellite tag, VHF tag); Instrument, drill carapace attachment; Count/survey /Harass (vessel and aerial surveys)

Supplemental Information

Status of Species: All 7 species of marine turtles are listed under the Endangered Species Act (ESA); 6 of those species fall under the jurisdiction of the NOAA Fisheries Office of Protected Resources. Green turtles and olive ridley turtles have breeding populations that were listed separately under the ESA, and therefore, have more than one ESA status.

Chelonia mydas: [Threatened distinct population segment (DPS): North Atlantic]. CITES Appendix I.
Eretmochelys imbricata: Endangered. CITES Appendix I.
Lepidochelys kempii: Endangered. CITES Appendix I. Dermochelys coriacea: Endangered. CITES Appendix I.
Caretta caretta: Threatened DPS: Northwest Atlantic Ocean. CITES Appendix I.
Lepidochelys olivacea: threatened in the Atlantic. CITES Appendix I.
Acipenser brevirostrum: Endangered. CITES Appendix I.
Acipenser oyxrinchus desotoi: Threatened. CITES Appendix II.
Acipenser oxyrinchus oxyrinchus: Endangered DPS: New York Bight, Chesapeake Bay, Carolina and South Atlantic. CITES Appendix II.
Pristis pectinata: Endangered US DPS. CITES Appendix I.

Intentional Lethal Take: Not Applicable

Anticipated Effects on Animals: We do not expect any harmful effects, either alone or cumulatively from any of our capture techniques except as noted in the lethal take section, given our long term experience with these methods. Only minor stress, discomfort, and pain are expected during sample collection. All of the biological sampling techniques are to be performed using sterile or antiseptic techniques with little to no effect on the animal.

Animals' reactions will be minimal movement of the head or flippers or 'flinching' during handling, measuring, flipper, PIT tagging and electronic transmitter tagging, blood sampling, and tissue biopsy sampling. The response to injection of sedative/anesthesia that we have observed in the past includes brief flinching response during which the turtles are lightly, manually restrained so that the motion doesn't cause injury during the procedure. During lavage and laparoscopy, the turtles' flippers are securely restrained and they are in dorsal recumbency, so they are not mobile. Due to the physical restraint and chemical sedation, reactions are minimized, and the turtles are not responding strongly to procedures.

For actions conducted during studies of loggerhead, green, and Kemp's ridley sea turtles in North Carolina, we have observed many recaptures during our research history and none of these have displayed any adverse effects resulting from these procedures:

Loggerhead Green turtle Kemp's ridley
Procedure Total cap Recap Total cap Recap Total cap Recap
Blood sampling 2570 488 304 26 262 17
Skin biopsy 1631 365 491 25 27 0
Radio tag 29 6 . . . .
Satellite tag 77 23 40 3 12 0
Laparoscopy 184 75 25 2 19 1

Laparoscopies and organ biopsies will be conducted only by a veterinarian or under his/her direct supervision and proper surgical techniques will be followed to ensure the well-being and health of the animal. Pain relieving medications will be administered prior to surgery to alleviate any pain or discomfort to the animal. We anticipate no long-term effects as we

have recaptured numerous turtles that have undergone laparoscopy and/or internally biopsied with no adverse effects present during our > 20 years of conducting this research.

We anticipate no long-term detrimental effects on the animals as a result of electronic transmitter attachments. Based on past experience with these types of techniques used by other turtle researchers, we expect that the turtles will experience some small additional stress or potential drag issues from attaching radio/sonic transmitters (Jones et al. 2011), but not significant increases in stress or discomfort to the turtle beyond what was experienced during other research activities. We do not expect the transmitters or the tracking to interfere with the turtles' normal activities after they are released. Turtles may experience momentary stress upon capture and handling. Recapture of satellite tagged animals show that there are not long term impacts from satellite tagging. Females have been shown to return to nesting beaches after tagging (C. Sasso, personal communication). The SEFSC has observed captured leatherbacks migrating to nesting beaches to nest with no negative impact to nesting ability.

Vessel surveys involving pursuit for > 5 minutes without capture for hard shell turtles have little effect on turtles. Turtles generally dive and swim a short distance in response to the vessel but do not leave the area or appear to suffer any negative consequences. Leatherbacks remain at the surface when approached, which allows them to be captured in the hoop net. Occasionally, leatherbacks will dive but resurface in the area (often feeding) which demonstrates little to no impact from approach. Release after capture results for all species of turtles swimming away from the vessel but satellite telemetry data demonstrate they do not leave the area and quickly return to "normal" behavior.

It is highly unlikely that the frequencies associated with the tags used in this study will attract predators. Satellite tags broadcast frequencies at a higher spectrum range than what sea turtles (~1 kHz) and most fish (<3 kHz) are capable of hearing. Sea turtles have low-frequency hearing sensitivity and are potentially affected by sound energy in the band below 1,000 Hz (Lenhardt 2003). Bartol et al. (1999) found the effective bandpass of the loggerhead sea turtle to be between at least 250 and 1000 Hz. Ridgeway et al. (1969) found the maximum sensitivity of the green sea turtle hearing range to fall within 300-500 Hz with a sharp decline at 750 Hz. Since the sonic tags that would be authorized for sea turtle tracking research will be in the 25 - 40 kHz range, they are well above this hearing threshold and thus, would not be heard by the turtles. We would not expect the transmitters to interfere with turtles' normal activities after they are released.

An important consideration is whether the sounds emitted by the sonic transmitters would attract potential predators, primarily sharks. Hearing data on sharks is limited, however, available laboratory studies suggest that shark hearing is less sensitive than some other fishes and all sharks tested show mainly low-frequency sensitivity. Casper et al. (2004) examined the hearing abilities of the nurse shark (Ginglymostoma cirratum), and results show that this species detected low frequency sounds from 100-1000 Hz with best sensitivity from 100-400 Hz. Hueter et al. (2004) explained that few audiograms have been published in elasmobranchs to date. While we don't have hearing information for all the sharks that could potentially prey on sea turtles, estimates for hearing sensitivity in available studies provided ranges of 25 Hz to 1,000 Hz. In general, these studies found that shark hearing is not as sensitive as in other tested fishes and that sharks are most sensitive to low frequency sounds (Kritzler and Wood, 1961; Banner, 1967; Casper et al. 2003). Thus, it appears that the sonic transmitters would not attract potential shark predators to the turtles, given the frequency of the sonic tags is well above the 1,000 Hz threshold.

ADD and AEP Acoustics

In the past during collection of AEPs in juvenile sea turtles, we have successfully measured hearing sensitivity using the manual restraint protocols described above. However, individuals respond differently to restrained submersion (with regards to blood oxygen and lactate levels). Previous studies on wild hatchling leatherback sea turtles in Trinidad and captive juvenile green turtles in Vancouver, British Columbia, have shown that manual restraint is ideal for individuals who are not stressed by light manual restraint; however, chemical restraint (anesthesia or sedation) was more suitable for individuals who are stressed by light manual restraint (better blood oxygen and lower lactate levels) (Harms et al. 2009, 2014). Anesthesia or sedation will only be used following a veterinary-approved protocol as a last resort after testing manual restraint on several individuals. If anesthesia is used, methodology will follow those developed for using evoked potentials to measure visual spectral sensitivity in sea turtles (Harms et al. 2007) and more recently for hearing in green sea turtles (Harms et al. 2009). Anesthesia will be induced with medetomidine 50 µg/kg (or dexmedetomidine 25 µg/kg) and ketamine 5 mg/kg combined IV in the dorsal cervical sinus. Turtles will be manually ventilated using a custom-designed double-cuffed extended endotracheal tube at a rate of two breaths in quick succession every two to three minutes with additional ventilations during pauses in hearing measurements. Medetomidine will be reversed with atipamezole (0.25 mg/kg half IV and half IM. Dr. Craig Harms will oversee all tests where anesthesia or sedation is used, will deliver anesthesia/sedation drugs, and monitor the health of the turtles through measurement of AEPs. Experiments using

anesthesia or sedation will not exceed 60 minutes.

No adverse effects are anticipated from manual or chemical restraint while collecting auditory evoked potentials (AEPs). Two recent investigations of sea turtle hearing using AEPs have included continuous veterinary monitoring and investigations of health and blood gas values (Harms et al. 2009, 2014, Piniak et al. 2016). Harms et al. (2009) and Piniak et al. (2016) obtained aerial AEPs from 5 juvenile green sea turtles using manual restraint and underwater AEPs from four 4 manually restrained juvenile green turtles and 2 anesthetized juvenile green turtles (including one turtle using both methods). Excessive movement by 3 manually restrained turtles prevented AEP recordings. They determined manual restraint was superior to anesthesia for turtles that did not resist restraint (better blood venous oxygen, successful AEPs), and anesthesia was superior to manual restraint for turtles that resisted restraint (marked increases in lactate and unsuccessful AEPs) (Harms et al. 2009). All turtles fed normally at the next scheduled feeding, and no adverse consequences were noted either behaviorally or in regularly monitored growth and weight gain (Harms et al. 2009). Harms et al. (2014) and Dow Piniak et al. (2012) obtained aerial AEPs from 7 sedated (midazolam at 2 or 3 mg/kg) and manually restrained (using light elastic wrap) hatchling leatherback turtles and 5 anesthetized hatchling leatherback turtles, and underwater AEPs from 11 sedated and manually restrained hatchling leatherback turtles. All turtles were monitored through AEP collection to full recovery (normal blood gas values – see Harms et al. 2014 for additional details). Hatchling release after AEP collection was scored qualitatively as good, fair, or poor based on vigor of hatchling crawling towards the ocean. All hatchlings scored well except for one fair and one poor release in the midazolam in water group. These two hatchlings had not emerged from their nests and were collected during nest excavations (such hatchlings were not used in subsequent AEP studies) (Harms et al. 2014). Though other studies have not included continuous veterinary monitoring, additional studies on hawksbills (Piniak 2012), green (Piniak, unpublished data), loggerhead (Piniak unpublished data) hatchlings all manually restrained using light elastic wrap have observed no adverse impacts and similar good releases back to the ocean after AEP collection.

No adverse effects are anticipated from tank studies to examine behavioral responses to potential acoustic deterrent device (ADD) signals. Similar studies were conducted from 2010-2011 with 12 juvenile loggerhead turtles caught in pound nets in Back Sound, North Carolina USA. All turtles were given 18-24 hours to acclimate to the tank before testing. Eleven of the 12 turtles acclimated to the tank (exhibited normal swimming and resting behavior) and their behavior was monitored before, during, and after simulated ADD signals presented using an underwater speaker. One turtle did not acclimate to the tank (continuously swam in circles in the tank) and was not tested. All turtles were released in good health less than 48 hours after collection near the collection location and swam away from the release location normally.

Entanglement Nets

This capture method would result in stresses due to interaction with the tangle net gear; however, nets will be monitored continuously and checked in their entirety every 30 minutes for entangled turtles, thus minimizing impact. Turtles can be affected by injury due to entanglement in the nets and/or drowning as a result of the forced submergence. Sea turtles are particularly prone to entanglement as a result of their body configuration and behavior. Records of stranded or entangled sea turtles reveal that fishing debris can wrap around the neck or flipper, or body of a sea turtle and severely restrict swimming or feeding. Sea turtles may also experience constriction of appendages as a result of the entanglement. Constriction may cut off blood flow, causing deep gashes, some severe enough to remove an appendage. Sea turtles that are forcibly submerged undergo respiratory and metabolic stress that can lead to severe disturbance of their acid-base balance. While most voluntary dives by sea turtles appear to be aerobic, showing little if any increases in blood lactate and only minor changes in acid-base status (pH level of the blood), sea turtles that are stressed as a result of being forcibly submerged through entanglement consume oxygen stores, triggering an activation of anaerobic glycolysis, and subsequently disturbing their acid-base balance, sometimes to lethal levels. It is likely that the rapidity and extent of the physiological changes that occur during forced submergence are functions of the intensity of struggling as well as the length of submergence (Lutcavage and Lutz 1997). Other factors to consider in the effects of forced submergence include the size of the turtle, ambient water temperature, and multiple submergences. Larger sea turtles are capable of longer voluntary dives than small turtles, so juveniles may be more vulnerable to the stress due to entanglement. During the warmer months, routine metabolic rates are higher, so the impacts of the stress due to entanglement may be magnified. With each forced submergence, lactate levels increase and require a long (even as much as 20 hours) time to recover to normal levels. Turtles are probably more susceptible to lethal metabolic acidosis if they experience multiple captures in a short period of time, because they would not have had time to process lactic acid loads (Lutcavage and Lutz 1997).

Seine Nets

Once most of the net has been brought into a vessel or onto the shore using a vessel under power, the remainder will be hauled by hand, until any turtles in the net are in water shallow

enough to be easily restrained. The net setting and retrieval process will be rapid and therefore any turtles that might become entangled in the net will quickly be brought to water shallow enough for them to reach the surface to breathe, and they will be disentangled as quickly as possible. The turtles may get held up against the seine underwater, but efforts would be made to minimize the duration, which would be for no more than 30 minutes.

Cast Nets
Capture by cast netting is a simple and non-invasive capture method, similar to capture by hoop or dip net. After capture in a cast net, the animal would be taken out of the net and quickly examined. The turtles would be held in a manner to minimize the stress to them. We do not expect that individual turtles would experience more than short-term stresses during this type of capture activity. No injury or mortality would be expected.

Hoop and Dip Nets
Capture by dip netting is a simple and non-invasive capture method. We do not expect that individual turtles will experience more than short-term stresses during this type of capture, and no injury or mortality is expected from dip netting. After capture in a hoop net, the animal would be taken out of the net, quickly examined, and briefly secured, if necessary, in a modified cargo net on deck so that its limbs are held close to its body to prevent injuries to the turtle and personnel, but breathing will be unrestricted.
The harassment of turtles during capture can result in raised levels of stressor hormones and can cause some discomfort. Based on past observations of similar research, these effects are expected to dissipate within a day (Stabenau and Vietti 1999). We do not anticipate any mortality or long-term adverse effect to the turtle due to the capture and activities to bring a captured turtle aboard the research vessel.

Hand Capture
Effects of capture and recapture by hand can result in raised levels of stressor hormones. The harassment of individual turtles during capture and handling could disrupt their resting or foraging cycles. However, these capture methods are simple and not invasive. The turtles would be held in a manner to minimize the stress to them. We do not expect that individual turtles would experience more than short-term stresses during this type of capture activity. No injury or mortality would be expected.

Pound Nets
Pound nets are a type of passive, stationary fishing gear that incidentally capture turtles but allow them to surface and breathe (Higgins & Pearson 1928). Since sea turtles readily enter this net and are able to breathe, we do not feel they are stressed within the confines of the pound net (Harms et al. 2003). However, once the boat enters the 'pound' to fish the net, turtles begin to swim vigorously, attempting to evade capture. Occasionally, turtles will become entangled in the webbing of the pound net itself, the heart, or the lead which results in constriction marks around their head and flippers and may lead to their death (< 2%) due to forced submergence. Forced submergence from entanglement in or impingement on pound net gear is likely comparable to forced submergence in other kinds of fishing gear, given that both instances involve sea turtles unable to reach the surface in a relatively stressful situation. Sea turtles forcibly submerged in any type of restrictive gear eventually suffer fatal consequences from prolonged anoxia and/or seawater infiltration of the lung (Lutcavage et al. 1997). Respiratory and metabolic stress due to forced submergence is also correlated with additional factors such as size and activity of the turtle, water temperatures, and biological and behavioral differences between species. For instance, the National Research Council (1990) suggested that physical and biological factors that increase energy consumption, such as high water temperatures and increased metabolic rates characteristic of small turtles, would be expected to exacerbate the harmful effects of forced submergence from trawl capture.

Trawl Nets
One of the risks to sea turtles from capture in trawl gear is forced submergence. Sea turtles forcibly submerged in any type of restrictive gear eventually suffer fatal consequences from prolonged anoxia and/or seawater infiltration of the lung (Lutcavage et al. 1997). A study examining the relationship between tow time and sea turtle mortality showed that mortality was strongly dependent on trawling duration, with the proportion of dead or comatose turtles rising from <1% for the first 10 minutes of capture to >1% after 50 minutes of capture (Henwood and Stuntz 1987, Sasso and Epperly 2006). However, metabolic changes that can impair a sea turtles ability to function can occur within minutes of a forced submergence. While most voluntary dives appear to be aerobic, showing little if any increases in blood lactate and only minor changes in acid-base status, the story is quite different in forcibly submerged turtles where oxygen stores are rapidly consumed, anaerobic glycolysis is activated, and acid-base balance is disturbed, sometimes to lethal levels (Lutcavage and Lutz

1997). Forced submergence of Kemp's ridley sea turtles in shrimp trawls resulted in an acid-base imbalance after just a few minutes (times that were within the normal dive times for the species) (Stabenau et al. 1991). Conversely, recovery times for acid-base levels to return to normal may be prolonged. Lutz and Dunbar-Cooper (1987) found that it took as long as 20 hours for the acid-base levels of loggerhead sea turtles to return to normal after capture in shrimp trawls for less than 30 minutes. This effect is expected to be worse for sea turtles that are recaptured before metabolic levels have returned to normal. The NRC (1990) has suggested that physical and biological factors that increase energy consumption, such as high water temperatures and increased metabolic rates characteristic of small turtles would be expected to exacerbate the harmful effects of forced submergence from trawl capture, although recent analysis indicates that the mortality rate of turtles is predicted to rise faster in winter than it is in summer (Sasso and Epperly 2006).
In order to minimize stress to a turtle that may be captured in a trawl set, the researchers propose to limit tow times to 30 minutes or less (bottom time).

Condition of bycaught non-target species

All bycaught non-target species will be released alive as quickly as possible. However, in some capture methods, a small percentage of the non-target species may be unintentionally harmed or killed.

Unintentional Lethal Take

There will not be any intentional lethal take under this permit. We do not intend any mortality or serious injury as a result of the proposed activities, but there is a slight risk from surgical procedures such as laparoscopies due to the need for systemic anesthetic and penetration of the peritoneal wall in proximity to organs for visualization of the gonads, as well as from some capture methods. While everything possible to mitigate the risk of serious injury or mortality will be done, occasionally circumstances beyond control can lead to mortality. For example, surgical procedures can have unforeseen complications (e.g., bleeding, infection, adverse reactions to drugs). Although every effort will be made to mitigate the risk of mortality due to capture (e.g., controlled mesh size, frequent net checks, tow time restrictions), a potential risk of mortality from forced submergence with some capture types (e.g., trawls, pound nets, entanglement nets) remains. We are requesting the lethal take of 2 loggerheads, 2 Kemp's ridleys, 2 greens, 1 leatherback, 1 olive ridley, and 1 hawksbill over the life of the permit.

Past Mortality summary

During the duration of the current permit (16733), three mortalities have been encountered. One small juvenile green sea turtle and two Kemp's ridley sea turtles were discovered, each entangled in the mesh of a different pound net in June 2017. Following this incident, mesh size for research pound nets was reduced to 1 3/4" to prevent any future entanglements. During the 5 years encompassed by the previous version of that permit (1551), we encountered only 2 sea turtle mortalities. A green sea turtle was found floating in the pound August 2009 and a Kemp's ridley was found entangled in the tunnel of the pound net October 2011. No known cause of death was determined for the green turtle (it may have floated in dead), while forced submerged caused by entanglement in the pound net tunnel line was determined to be the cause of death for the Kemp's ridley. We don't expect these 5 mortalities to have an adverse effect on the overall sea turtle population based on available abundance estimates by Goodman et al. (2007) which were underestimates of the sea turtle population. We were able to determine the cause of the Kemp's ridley's entanglement and took measures to ensure that this entanglement did not occur in the future. Mitigation was also implemented following the entanglement of 3 turtles under permit 16733, to reduce the mesh size for both pounds and hearts in research nets.

Anticipated effects on the species or DPS

Reproductive effects to populations or DPS resulting from brief, infrequent interactions with adult-stage loggerhead, green, Kemp's ridley, hawksbill, and leatherback sea turtles during in-water research authorized under this permit are not anticipated.

Although mortalities resulting from captures or procedures authorized under this permit are not expected, it is possible that unforeseen events could result in injury and/or death.

However, should the small number of mortalities for which authorization is requested under this permit occur, it is not anticipated that they would have significant effect on the species or DPS under study.

The most commonly-encountered and studied sea turtles in the southeast US where studies will be conducted are green turtles from the N Atlantic DPS (threatened) and loggerheads from the NW Atlantic Ocean DPS (threatened). The most recent status review for N Atlantic green turtles indicated overall increasing nesting populations. Correspondingly, greater numbers of small, juvenile green turtles have been documented in at least one foraging population (McNeill et al., In review). Recent data suggest that the loggerhead nesting numbers in Florida, which represent the largest aggregation for the population in this region, are increasing as well.

Kemp's ridley sea turtles are listed as endangered. Furthermore, based on an abrupt deviation from the recovery trajectory for the nesting population coincident with the 2010 DWH oil spill and in combination with continued anthropogenic threats, the 2015 status review increased its Recovery Priority Number for the species from 5 to 1. Despite this nesting decrease, the number of small, neritic juvenile Kemp's ridleys in North Carolina's inshore foraging areas appears to be increasing (McNeill et al., In review; pers. Comm.). Also, nesting numbers for 2017 appear to have increased substantially (e.g., https://www.nps.gov/pais/learn/nature/2017-nesting-season.htm), offering encouragement regarding improvement in population status.

Hawksbill sea turtles are designated as endangered under the ESA and worldwide; those encountered in mainland US waters are most likely to originate from nesting populations in Mexico, Barbados, the USVI, Cuba, or Puerto Rico (Bowen et al. 2007; Wood et al. 2013), although a small number of hawksbills nest in Florida each year. According to the 2013 hawksbill status review, while current trends in Cuban nesting numbers remained unknown, available data indicated recent increases in the USVI Buck Island Reef National Monument, Barbados, Puerto Rico, and all Caribbean sites in Mexico.

While the NW Atlantic leatherback population is listed as endangered under the US ESA, the most recent IUCN assessment for this population indicates that the nesting population has increased considerably, 20.6% over the last 3 generations (Tiwari et al. 2013). As a result, the IUCN Red List of Threatened Species designates the NW Atlantic leatherback population status as Least Concern.

Life stages for hard-shelled sea turtle species most frequently encountered during research conducted by the SEFSC are small neritic juveniles, which have lower reproductive value to the population than large neritic juveniles and adults. In contrast, leatherback research efforts focus on large juveniles and adults. Every possible measure will be taken to avoid mortalities during research activities for all species and life stages studied. However, given the status of the populations potentially affected by a small number of mortalities for either small, neritic juvenile hard-shelled turtles or leatherbacks over the lifetime of this permit, a significant effect would not be expected, should only those mortalities authorized under this permit occur.

Measures to Minimize Effects:

Capture methods

The area will be surveyed prior to setting entanglement nets or trawls to ensure that no marine mammals are within the study area (within a 100' radius of the research vessel or net). Rope attaching floats to nets will not have kinks or contain slack that could present an entanglement hazard. All non-target species will be released as quickly as possible to avoid any mortality. Entanglement nets will be checked every 30 min to avoid mortality of any captured animals. Pound nets allow animals to freely swim and do not normally gill animals so that mortality and injury is minimized. Pound nets and leaders will be checked every 24 hours. All live turtles encountered in pound nets will be immediately removed by holding the anterior and posterior sections of the carapace and gently setting the turtle into the bottom of the boat. The turtle will be restrained within a section of the boat as it is being tagged and morphometrics and tissue samples are collected. These methods of capture will not adversely affect the physical or biological environment.

A study that compared the effects of capture in trawls and pound nets on the venous blood gases and lactates of loggerheads revealed that capture in a pound net can have a negative effect on blood gas, acid-base, and lactate status as well as the respiratory physiology of loggerheads (Harms et al. 2003). The effects of the confinement and forced submergence on live turtles are expected to dissipate within a day (Stabenau and Vietti 1999). Although a number of fish species will also be captured in pound nets, since pound nets are a stationary

gear that entrap animals while still allowing them to swim and breathe, we expect little (< 1%) or no mortality associated with this gear. There may be some fish bycatch mortality when conducting trawls, but efforts will be made to release all animals as carefully and quickly as possible to avoid any mortality. In the event that we capture an injured or ill sea turtle, we will follow state and federal sea turtle stranding reporting protocols and report the turtle to the nearest state sea turtle stranding network rehabilitation or veterinary group. Treatment for comatose turtles will be followed if necessary.

Tagging and biopsy sample collection

All tagging and biopsy sample collection will be conducted in accordance with the revised edition of NOAA Tech Memo NMFS-SEFSC-579 (approved by IACUC) http://www.sefsc.noaa.gov/turtles/TM_579_SEFSC_STRTM.pdf.
Only minor stress, discomfort, and pain are expected during sample collection. All equipment that comes into contact with sea turtle body fluids, cuts or lesions will be disinfected between the processing of each turtle using a 1:10 solution of 5-6% bleach or other appropriate disinfectant. A separate set of sampling equipment for handling animals displaying fibropapilloma tumors will be maintained and thoroughly disinfected if ever used. Tagging and biopsy sites will be disinfected using aseptic techniques (10% povidone-iodine swab followed by an isopropyl alcohol swab twice where appropriate).

Satellite tagging

All tags and attachments will weigh less than 2-5% of each turtle's total body weight in air. Epoxy attached tags are packaged/potted in colored epoxy so the tag is cryptic on the species tracked. Thus, turtles should not be at increased risk to predation due to visual targeting by predators (Hawkins 2004; Wilson and McMahon 2006). All methods for neonate tag attachment were tested on lab-reared sea turtles prior to implementation. Absolute growth and body condition indices (CI) of turtles with tag attachments were compared to the growth and CI of an untagged control group; the consequences of drag are realized in energetic costs to the turtle. With neonate turtles, energetic costs are manifested in decreased growth; a decline in growth rate or CI associated with tag attachment would reflect added costs. No statistically significant differences were found between the control and treatment groups (Mansfield et al. 2012). Normal growth and scute surface shedding will result in natural tag shedding, minimizing the long-term effects of tagging. There should be no pain involved in the procedures described above. There may be momentary distress from being handled when turtles are weighed, and released. No sea turtle mortalities have occurred in previous work related to these projects. Tethered tag attachments will be attached with corrodible and break away links to allow the turtle to break free if the tag and tether becomes entangled. [Leatherbacks observed on nesting beaches after having been tagged years before showed no signs of injury or harm with only a small scar where the tag had been attached (C. Sasso personal observation). Other than the initial drilling, there appears to be no harm or injury of any concern.

Given our current understanding of the cost of drag associated with various transmitter devices, we will use the best available practices to minimize drag and other effects on the turtles (Jones et al. 2011). This includes using hydrodynamic tag designs, minimal antenna size with proper orientation, proper tag position away from the peak of the carapace to the extent practicable, placing double tags in line, and minimizing the use of base plates and built up adhesives (Jones et al. 2011).

Assessing the impact of fishery interactions on incidentally captured turtles to estimate post-interaction survival rates, behavior and movements is important research for which there are not currently alternatives to satellite tagging. This research would be of minimal risk to leatherbacks, which tend to be hooked externally and swim away vigorously after release from fishing gear. Hardshell turtles interacting with hook and line gear or forcibly submerged in trawls are not expected to be adversely affected by applying a satellite tag after the fishery interaction. In previous consultations with Dr. Brian Stacy, we discussed when it is safe to tag animals that have interacted with fishing gear to ensure that tagging does not compromise the animal's health. It was agreed that the potential benefits of this work outweighed the risks, and we can discuss the details of future plans with a veterinarian prior to conducting the work if necessary.

Special handling protocols for leatherbacks

Leatherbacks will only be boated if they can be easily and safely brought on board the vessel. Leatherback turtles will be handled by at least two people, one on either side of the turtle, and precautions will be taken to ensure that animals are supported from underneath and not turned on their back.

Marine Mammals

Trawling will not be initiated when marine mammals (with exception of dolphins or porpoises) are observed within the vicinity of the research, and the marine mammals will be allowed to either leave or pass through the area safely before trawling is initiated. Every effort will be made to prevent interactions with all marine mammals. Should a marine mammal become captured, research will be stopped immediately and all available resources will be dedicated to freeing the animal. All captures will be reported as soon as possible. If a North Atlantic Right Whale is observed, the researchers will not approach within 500 yards of the whale, and the sighting will be reported as required.

Manatees

Although manatee interactions are not anticipated, all vessel personnel will be informed that it is illegal to intentionally take manatees. Crew involved in research will keep a look out for manatees at all times, wearing polarized sunglasses to reduce glare, and one member of the crew will be experienced in and dedicated to watching for manatee during all in-water activities. They will obey all posted manatee protection speed zones, Federal manatee sanctuary and refuge restrictions, and other similar state and local regulations while conducting in-water activities. If a manatee is sighted within 100 meters of the vessel, all activities will stop, and will only resume when the animal has left the safety zone, or 30 minutes have elapsed since the last manatee observation. If a manatee is incidentally captured, the vessel will be stopped and all engines turned off or put in neutral. Proper release guidelines will be followed and the capture will be reported immediately. Personnel will be briefed on the dangers of freeing a manatee, including to keep fingers out of nets, not wear jewelry, and to be careful to say away from the manatee's paddle.

Smalltooth sawfish

Although sawfish interactions are not expected, if captured incidentally during the course of research, it will be disentangled, handled with care, and released immediately. NMFS safe handling and release guidelines will be followed as required.

Sturgeon

Although sturgeon interactions are not expected, if captured incidentally during the course of research, it will be disentangled, scanned for PIT tags, and released immediately. If possible, all individuals will be kept in the water and returned to neutral buoyancy prior to release, and smooth rubber gloves will be worn when handling. Sturgeon overly stressed from capture will be resuscitated and/or allowed to recover and released without further handling. Sturgeon encounters will be reported as required.

Johnson's Sea Grass and Critical Habitat

No research activities will be conducted over, on or immediately adjacent to Johnson's sea grass or in Johnson's sea grass critical habitat.

Other sea grass species, live bottom, or coral

Research/capture methods that could impact the benthic habitat will not be conducted over, on, or immediately adjacent to any non-listed sea grass species (SAV), live bottom, or coral habitat. In the event that capture nets must be deployed in an area containing sea grasses (e.g., to target green turtles), care will be taken to ensure that no damage will be done the sea grass bed. Researchers will take all practicable steps to identify SAV, coral communities, and live/hard bottom habitats and EFH, and avoid setting gear in such areas. They will use

strategies and tools such as charts, GIS, sonar, fish finders, or other electronic devices to help determine the characteristics and suitability of bottom habitat prior to deploying gear. If research gear is lost, a diligent effort will be made to recover any lost gear. Anchors will be hand set when conditions permit, and care will be taken to avoid damaging sea grasses and bottom habitat.

Non-target species

All incidentally captured non-target bycatch species will be returned to the water as soon as possible in an effort to minimize mortality.

Describe measures you will implement to ensure your activities are conducted in a humane manner, with minimal disturbance, stress, and harm to the subject animals. Explain how you determined your methods are those that will have the least potential for pain and stress (e.g., summarize your alternatives search).

The cumulative years of experience among our research staff provide us with the handling skills required to safely capture and handle sea turtles with minimal disturbance and stress. All of the minimally invasive techniques we will use (skin biopsy collection, blood sampling, PIT tag injection, Inconel tag application) will be conducted using aseptic techniques so as to avoid inadvertently infecting the turtle. For all procedures, disposable gloves will be worn, and sampling areas will be thoroughly cleaned and disinfected, in some cases twice, using povidone-iodine swabs followed by alcohol swabs. More invasive techniques (gastric lavage, laparoscopies, and organ tissue biopsies) will only be conducted by a veterinarian or other experienced researcher using sterile techniques and keeping the turtle as comfortable and pain free as possible.

We likewise will implement the following to ensure our survey and capture techniques are conducted in a humane manner, with minimal disturbance, stress, and harm to the subject animals. In order to minimize stress to a turtle that may be captured in a trawl set, the researchers will limit tow times to 30 minutes or less (bottom time). Other capture nets (entanglement, seine, cast) will be checked at least every 30 minutes. Pound nets, including the leader, will be monitored daily.

All the stress, discomfort, pain, suffering, injury or mortality will be kept to a minimum so as not to compromise the health, welfare or safety of the animal. Our research targets filling important data gaps for species recovery. Therefore, although there may be minimal effects to the individual animals sampled, we feel that the overall benefit to the species far outweighs these individual level impacts.

Short- and long-term post-procedure monitoring protocols

All turtles that have been sampled (i.e., measured, flipper and PIT tagged, biopsied) will be thoroughly examined prior to release to ensure there have been no adverse effects from our actions. Turtles that have undergone a laparoscopic procedure will be retained in a holding facility for up to 24 hours and monitored to ensure that they are capable of independent behavior (e.g., able to submerge and swim freely). Suture and biopsy sites of recaptured turtles will be closely examined for signs of infection. Satellite tracked turtles can be monitored by their subsequent movements and survival.

This permit application has been reviewed and is pending approval by the SEFSC Institutional Animal Care and Use Committee (IACUC).

Research Coordination

Efforts will be made to collaborate and coordinate research with others in our study areas. Colleagues will be contacted during the resource gathering phase of the project as a means of informing, and potentially collaborating with, other researchers in the study area so that we are not working in the same waters concurrently and thereby minimizing the chance that an animal is captured by more than one permit holder per day. Proposed research and preliminary results will be presented at regional sea turtle meetings. In the past, we have willingly collaborated with many research partners to minimize the number of animals captured to conduct our collective research, maximizing the amount of data collected from each encounter.

We will continue to encourage such collaboration in the future to avoid redundancy and maximize the knowledge gained from the species.

Within NC, SEFSC STP staff regularly communicate with all other groups engaged in sea turtle-related activities to ensure coordination and collaboration on sea turtle activities conducted in the state. These include NC Wildlife Resources Commission, NC State University College of Veterinary Medicine, NC Aquariums, UNC-Wilmington, UNC Coastal Studies Institute, Duke University, National Park Service, NC Division of Marine Fisheries, NC National Estuarine Research Reserve, and BOEM. Our current research collaborators in Miami include Florida State University, USGS, University of Florida, Duke University, North Carolina State University, Northeast Fisheries Science Center, and Southwest Fisheries Science Center. Collaborations include sharing of vessels, samples and data.

Resources Needed to Accomplish Objectives: Our on-call and attending veterinarian for this research is Dr. Craig Harms, DVM. Other veterinarians we collaborate with for our research include Dr. Brian Stacy, DVM, Dr. Emily Christiansen, DVM, and Dr. Terry Norton, DVM. NOAA will fund, support, and oversee these research activities. The Southeast Fisheries Science Center has a well-established sea turtle research program involving over 30 FTE and contract personnel, in addition to several observer programs. Researchers have a degree in biology or a related field, and they are qualified and trained to conduct this research. The SEFSC Sea Turtle Program uses a standardized training program to ensure that researchers have demonstrated proper sea turtle handling and sampling techniques under SEFSC staff supervision before conducting this research. We will continue to collaborate with other researchers, often with their own sources of funding. We also will continue to compete for additional grants to further fund this research.

Disposition of Tissues: A tissue and DNA "bank" has been established at the NOAA-NMFS Southwest Science Center's La Jolla Laboratory to archive these biopsy samples for long-term storage in order to provide a repository for samples for these and future conservation research studies. They will be stored until consumed during analysis at the following location: Southwest Fisheries Science Center, 3333 North Torrey Pines Court, La Jolla, CA 92037-1002, (858) 546-7166. Other samples will be distributed as previously described in the project description in attached Table A.

Public Availability of Product/Publications: Research will be reported in a variety of venues, including unpublished reports, Technical Memoranda, and peer-reviewed journals. Our publications are listed in the attached SEFSC Publications file. Each of these publications will be posted on our website at http://www.sefsc.noaa.gov/seaturtlesprogram.jsp.

Location/Take Information

Location

Research Area: Atlantic Ocean **States:** AL,CT,DE,FL,GA,LA,MA,MD,ME,MS,NC,NH,NJ,NY,PR,RI,SC,TX,VA,VI **Stream Name:** North Atlantic Ocean, Gulf of Mexico, Caribbean Sea including embayments and tributaries
Location Description: Abundance, Health Demographic and Behavior Studies in the North Atlantic, Gulf of Mexico and Caribbean Sea – Beaufort Laboratory

Take Information

Line	Ver	Species	Listing Unit/Stock	Production /Origin	Life Stage	Sex	Expected Take	Takes Per Animal	Take Action	Observe /Collect Method	Procedure	Transport Record	Begin Date	End Date
1		Turtle, green sea	North Atlantic DPS (NMFS Threatened)	Wild	All except hatchling	Male and Female	50	1	Capture/Handle/Release	Net, Tangle	Epibiota removal; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab;	1;2;3;4;5;6	8/7/2018	9/30/2027

										Sample, scute; Sample, skin biopsy; Sample, tears; Transport; Ultrasound; Weigh				
		Details: Capture by hand, hoop net, cast net, pound net (NC only), tangle or seine net, trawl (NC or GoMx only); Other = cloacal temperature												
2		Turtle, green sea	North Atlantic DPS (NMFS Threatened)	Wild	All except hatchling	Male and Female	100	1	Harass/Sampling	Capture under other authority	Epibiota removal; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, scute; Sample, skin biopsy; Sample, tears; Transport; Ultrasound; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Other = cloacal temperature												
3		Turtle, green sea	North Atlantic DPS (NMFS Threatened)	Wild	All except hatchling	Male and Female	25	1	Capture/Handle/Release	Net, Tangle	Epibiota removal; Imaging (e.g., MRI, CT, CAT, X-Ray); Laparoscopy ; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fat ; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, organ biopsy; Sample, scute; Sample, skin biopsy; Sample, tears; Transport; Ultrasound; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Capture by hand, hoop net, cast net, pound net (NC only), tangle or seine net, trawl (NC or GoMx only); Other = cloacal temperature, tetracycline marking; sample, tears												
											Epibiota removal; Imaging (e.g., MRI, CT, CAT, X-Ray); Laparoscopy ; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag;			

4		Turtle, green sea	North Atlantic DPS (NMFS Threatened)	Wild	All except hatchling	Male and Female	30	1	Harass/Sampling	Capture under other authority	Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fat ; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, organ biopsy; Sample, scute; Sample, skin biopsy; Sample, tears; Transport; Ultrasound; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Other = cloacal temperature												
5		Turtle, green sea	North Atlantic DPS (NMFS Threatened)	Wild	All except hatchling	Male and Female	25	1	Capture/Handle/Release	Net, Tangle	Epibiota removal; Instrument, drill carapace attachment; Instrument, epoxy attachment; Instrument, suction-cup; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, scute; Sample, skin biopsy; Sample, tears; Tracking; Transport; Ultrasound; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Capture by hand, hoop net, cast net, pound net (NC only), tangle or seine net, trawl (NC or GoMx only); Other = cloacal temperature; Up to 2 tags per animal.												
6		Turtle, green sea	North Atlantic DPS (NMFS Threatened)	Wild	All except hatchling	Male and Female	25	1	Harass/Sampling	Capture under other authority	Epibiota removal; Instrument, drill carapace attachment; Instrument, epoxy attachment; Instrument, suction-cup; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab;	1;2;3;4;5;6	8/7/2018	9/30/2027

											Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, scute; Sample, skin biopsy; Sample, tears; Tracking; Transport; Ultrasound; Weigh			
		Details: Other = cloacal temperature; Up to 2 tags per animal												
7		Turtle, green sea	North Atlantic DPS (NMFS Threatened)	Wild	All except hatchling	Male and Female	15	1	Capture/Handle/Release	Net, Tangle	Epibiota removal; Imaging (e.g., MRI, CT, CAT, X-Ray); Instrument, drill carapace attachment; Instrument, epoxy attachment; Instrument, suction-cup; Laparoscopy ; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fat ; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, organ biopsy; Sample, scute; Sample, skin biopsy; Sample, tears; Tracking; Transport; Ultrasound; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Capture by hand, hoop net, cast net, pound net (NC only), tangle or seine net, trawl (NC or GoMx only); Other = cloacal temperature; Up to 2 tags per animal												
8		Turtle, green sea	North Atlantic DPS (NMFS Threatened)	Wild	All except hatchling	Male and Female	10	1	Harass/Sampling	Capture under other authority	Epibiota removal; Imaging (e.g., MRI, CT, CAT, X-Ray); Instrument, drill carapace attachment; Instrument, epoxy attachment; Instrument, suction-cup; Laparoscopy ; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample,	1;2;3;4;5;6	8/7/2018	9/30/2027

											blood; Sample, cloacal swab; Sample, fat ; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, organ biopsy; Sample, scute; Sample, skin biopsy; Sample, tears; Tracking; Transport; Ultrasound; Weigh			
		Details: Other = cloacal temperature; Up to 2 tags per animal												
9	A	Turtle, green sea	North Atlantic DPS (NMFS Threatened)	Wild	All except hatchling	Male and Female	10	1	Capture/Handle/Release	Net, Tangle	Bycatch reduction experiments; Captive, lab experiments; Epibiota removal; Imaging (e.g., MRI, CT, CAT, X-Ray); Laparoscopy ; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fat ; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, organ biopsy; Sample, scute; Sample, skin biopsy; Transport; Ultrasound; Weigh	1;2;3;4;5;6	4/10/2019	9/30/2027
		Details: Capture by hand, dip net, hoop net, cast net, pound net (NC only), tangle or seine net, trawl (NC or GoMx only); Other = cloacal temperature. ADD field and lab trials. AEP lab trials.												
10	A	Turtle, green sea	North Atlantic DPS (NMFS Threatened)	Wild	All except hatchling	Male and Female	5	1	Harass/Sampling	Capture under other authority	Bycatch reduction experiments; Captive, lab experiments; Epibiota removal; Imaging (e.g., MRI, CT, CAT, X-Ray); Laparoscopy ; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab;	1;2;3;4;5;6	4/10/2019	9/30/2027

											Sample, fat ; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, organ biopsy; Sample, scute; Sample, skin biopsy; Transport; Ultrasound; Weigh			
		Details: Other = cloacal temperature. ADD and AEP lab trials.												
11	A	Turtle, green sea	North Atlantic DPS (NMFS Threatened)	Wild	All except hatchling	Male and Female	10	1	Capture/Handle/Release	Net, Tangle	Bycatch reduction experiments; Captive, lab experiments; Epibiota removal; Instrument, drill carapace attachment; Instrument, epoxy attachment; Instrument, suction-cup; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, scute; Sample, skin biopsy; Tracking; Transport; Ultrasound; Weigh	1;2;3;4;5;6	4/10/2019	9/30/2027
		Details: Capture by hand, dip net, hoop net, cast net, pound net (NC only), tangle or seine net, trawl (NC or GoMx only); Other = cloacal temperature. Up to 2 tags per animal. ADD and AEP lab trials.												
12	A	Turtle, green sea	North Atlantic DPS (NMFS Threatened)	Wild	All except hatchling	Male and Female	5	1	Harass/Sampling	Capture under other authority	Bycatch reduction experiments; Captive, lab experiments; Epibiota removal; Instrument, drill carapace attachment; Instrument, epoxy attachment; Instrument, suction-cup; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other;	1;2;3;4;5;6	4/10/2019	9/30/2027

											Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, scute; Sample, skin biopsy; Tracking; Transport; Ultrasound; Weigh			
		Details: Other = cloacal temperature; Up to 2 tags per animalADD and AEP lab trials.												
13	A	Turtle, green sea	North Atlantic DPS (NMFS Threatened)	Wild	All except hatchling	Male and Female	10	1	Capture/Handle/Release	Net, Tangle	Bycatch reduction experiments; Captive, lab experiments; Epibiota removal; Imaging (e.g., MRI, CT, CAT, X-Ray); Instrument, drill carapace attachment; Instrument, epoxy attachment; Instrument, suction-cup; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fat ; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, scute; Sample, skin biopsy; Transport; Ultrasound; Weigh	1;2;3;4;5;6	4/10/2019	9/30/2027
		Details: Capture by hand, dip net, hoop net, cast net, pound net (NC only), tangle or seine net, trawl (NC or GoMx only); Other = cloacal temperature; Up to 2 tags per animal.ADD and AEP lab trials.												
14	A	Turtle,	North Atlantic DPS	Wild	All except	Male and	5	1	Harass/Sampling	Capture under other	Bycatch reduction experiments; Captive, lab experiments; Epibiota removal; Imaging (e.g., MRI, CT, CAT, X-Ray); Instrument, drill carapace attachment; Instrument, epoxy attachment; Instrument, suction-cup; Lavage, gastric; Mark, carapace (temporary); Mark,	1;2;3;4;5;6	4/10/2019	9/30/2027

14	A	green sea	(NMFS Threatened)	Wild	except hatchling	and Female	5	1	Harass/Sampling	under other authority	flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, scute; Sample, skin biopsy; Transport; Ultrasound; Weigh	1;2;3;4;5;6	4/10/2019	9/30/2027
		Details: Other = cloacal temperature; Up to 2 tags per animal.ADD and AEP lab trials.											
15	A	Turtle, green sea	North Atlantic DPS (NMFS Threatened)	Wild	All except hatchling	Male and Female	10	1	Capture/Handle/Release	Net, Tangle	Bycatch reduction experiments; Captive, lab experiments; Epibiota removal; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, scute; Sample, skin biopsy; Sample, tears; Transport; Ultrasound; Weigh	1;2;3;4;5;6	4/10/2019	9/30/2027
		Details: Capture by hand, hoop net, cast net, pound net (NC only), tangle or seine net, trawl (NC or GoMx only); Other = cloacal temperature.ADD and AEP lab trials.											
16	A	Turtle, green sea	North Atlantic DPS (NMFS Threatened)	Wild	All except hatchling	Male and Female	35	1	Harass/Sampling	Capture under other authority	Bycatch reduction experiments; Captive, lab experiments; Epibiota removal; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, scute; Sample, skin	1;2;3;4;5;6	4/10/2019	9/30/2027

											biopsy; Sample, tears; Transport; Ultrasound; Weigh				
		Details: Other = cloacal temperature. ADD and AEP lab trials.													
17		Turtle, hawksbill sea	Range-wide (NMFS Endangered)	Wild	All except hatchling	Male and Female	9	1	Capture/Handle/Release	Net, Tangle	Epibiota removal; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, scute; Sample, skin biopsy; Sample, tears; Transport; Ultrasound; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Capture by hand, hoop net, cast net, pound net (NC only), tangle or seine net, trawl (NC or GoMx only); Other = cloacal temperature.													
18		Turtle, hawksbill sea	Range-wide (NMFS Endangered)	Wild	All except hatchling	Male and Female	3	1	Harass/Sampling	Capture under other authority	Epibiota removal; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, scute; Sample, skin biopsy; Sample, tears; Transport; Ultrasound; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Other = cloacal temperature.													
19		Turtle, hawksbill sea	Range-wide (NMFS Endangered)	Wild	All except hatchling	Male and Female	7	1	Capture/Handle/Release	Net, Tangle	Epibiota removal; Instrument, drill carapace attachment; Instrument, epoxy attachment; Instrument, suction-cup; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab;	1;2;3;4;5;6	8/7/2018	9/30/2027

											Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, scute; Sample, skin biopsy; Sample, tears; Tracking; Transport; Ultrasound; Weigh			
		Details: Capture by hand, hoop net, cast net, pound net (NC only), tangle or seine net, trawl (NC or GoMx only); Other = cloacal temperature; Up to 2 tags per animal.												
20		Turtle, hawksbill sea	Range-wide (NMFS Endangered)	Wild	All except hatchling	Male and Female	2	1	Harass/Sampling	Capture under other authority	Epibiota removal; Instrument, drill carapace attachment; Instrument, epoxy attachment; Instrument, suction-cup; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, scute; Sample, skin biopsy; Sample, tears; Tracking; Transport; Ultrasound; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Other = cloacal temperature; Up to 2 tags per animal.												
21		Turtle, Kemp's ridley sea	Range-wide (NMFS Endangered)	Wild	All except hatchling	Male and Female	50	1	Capture/Handle/Release	Net, Tangle	Epibiota removal; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, scute; Sample, skin biopsy; Sample, tears; Transport; Ultrasound; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Capture by hand, hoop net, cast net, pound net (NC only), tangle or seine net, trawl (NC or GoMx only); Other = cloacal temperature.												

22		Turtle, Kemp's ridley sea	Range-wide (NMFS Endangered)	Wild	All except hatchling	Male and Female	100	1	Harass/Sampling	Capture under other authority	Epibiota removal; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, scute; Sample, skin biopsy; Sample, tears; Transport; Ultrasound; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Other = cloacal temperature.												
23		Turtle, Kemp's ridley sea	Range-wide (NMFS Endangered)	Wild	All except hatchling	Male and Female	30	1	Capture/Handle/Release	Net, Tangle	Epibiota removal; Imaging (e.g., MRI, CT, CAT, X-Ray); Laparoscopy ; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fat ; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, organ biopsy; Sample, scute; Sample, skin biopsy; Sample, tears; Transport; Ultrasound; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Capture by hand, hoop net, cast net, pound net (NC only), tangle or seine net, trawl (NC or GoMx only); Other = cloacal temperature.												
24		Turtle, Kemp's ridley sea	Range-wide (NMFS Endangered)	Wild	All except hatchling	Male and Female	20	1	Harass/Sampling	Capture under other authority	Epibiota removal; Imaging (e.g., MRI, CT, CAT, X-Ray); Laparoscopy ; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fat ; Sample, fecal;	1;2;3;4;5;6	8/7/2018	9/30/2027

										Sample, muscle biopsy; Sample, nasal swab; Sample, organ biopsy; Sample, scute; Sample, skin biopsy; Sample, tears; Transport; Ultrasound; Weigh			
		Details: Other = cloacal temperature.												
25		Turtle, Kemp's ridley sea	Range-wide (NMFS Endangered)	Wild	All except hatchling	Male and Female	30	1	Capture/Handle/Release	Net, Tangle	Epibiota removal; Instrument, drill carapace attachment; Instrument, epoxy attachment; Instrument, suction-cup; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, scute; Sample, skin biopsy; Sample, tears; Tracking; Transport; Ultrasound; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Capture by hand, hoop net, cast net, pound net (NC only), tangle or seine net, trawl (NC or GoMx only); Other = cloacal temperature. Up to 2 tags per animal.												
26		Turtle, Kemp's ridley sea	Range-wide (NMFS Endangered)	Wild	All except hatchling	Male and Female	20	1	Harass/Sampling	Capture under other authority	Epibiota removal; Instrument, drill carapace attachment; Instrument, epoxy attachment; Instrument, suction-cup; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, scute; Sample, skin biopsy; Sample, tears;	1;2;3;4;5;6	8/7/2018	9/30/2027

											Transport; Ultrasound; Weigh				
		Details: Other = cloacal temperature. Up to 2 tags per animal.													
27		Turtle, Kemp's ridley sea	Range-wide (NMFS Endangered)	Wild	All except hatchling	Male and Female	10	1	Capture/Handle/Release	Net, Tangle	Epibiota removal; Imaging (e.g., MRI, CT, CAT, X-Ray); Instrument, drill carapace attachment; Instrument, epoxy attachment; Instrument, suction-cup; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, scute; Sample, skin biopsy; Sample, tears; Tracking; Transport; Ultrasound; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Capture by hand, hoop net, cast net, pound net (NC only), tangle or seine net, trawl (NC or GoMx only); Other = cloacal temperature. Up to 2 tags per animal.													
28		Turtle, Kemp's ridley sea	Range-wide (NMFS Endangered)	Wild	All except hatchling	Male and Female	20	1	Harass/Sampling	Capture under other authority	Epibiota removal; Imaging (e.g., MRI, CT, CAT, X-Ray); Instrument, drill carapace attachment; Instrument, epoxy attachment; Instrument, suction-cup; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, scute; Sample, skin biopsy; Sample, tears; Transport; Ultrasound; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Other = cloacal temperature. Up to 2 tags per animal.													

29	A	Turtle, Kemp's ridley sea	Range-wide (NMFS Endangered)	Wild	All except hatchling	Male and Female	10	1	Capture/Handle/Release	Net, Tangle	Bycatch reduction experiments; Captive, lab experiments; Epibiota removal; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, scute; Sample, skin biopsy; Sample, tears; Transport; Ultrasound; Weigh	1;2;3;4;5;6	4/10/2019	9/30/2027
		Details: Capture by hand, hoop net, cast net, pound net (NC only), tangle or seine net, trawl (NC or GoMx only); Other = cloacal temperature.ADD and AEP lab trials.												
30	A	Turtle, Kemp's ridley sea	Range-wide (NMFS Endangered)	Wild	All except hatchling	Male and Female	5	1	Harass/Sampling	Capture under other authority	Bycatch reduction experiments; Captive, lab experiments; Epibiota removal; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, scute; Sample, skin biopsy; Sample, tears; Transport; Ultrasound; Weigh	1;2;3;4;5;6	4/10/2019	9/30/2027
		Details: Other = cloacal temperature.ADD and AEP lab trials.												
		Turtle,			All	Male					Bycatch reduction experiments; Captive, lab experiments; Epibiota removal; Imaging (e.g., MRI, CT, CAT, X-Ray); Laparoscopy ; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark,			

31	A	Turtle, Kemp's ridley sea	Range-wide (NMFS Endangered)	Wild	All except hatchling	Male and Female	10	1	Capture/Handle/Release	Net, Tangle	oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fat ; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, organ biopsy; Sample, scute; Sample, skin biopsy; Transport; Ultrasound; Weigh	1;2;3;4;5;6	4/10/2019	9/30/2027
		Details: Capture by hand, dip net, hoop net, cast net, pound net (NC only), tangle or seine net, trawl (NC or GoMx only); Other = cloacal temperature.ADD and AEP lab trials.												
32	A	Turtle, Kemp's ridley sea	Range-wide (NMFS Endangered)	Wild	All except hatchling	Male and Female	5	1	Harass/Sampling	Capture under other authority	Bycatch reduction experiments; Captive, lab experiments; Epibiota removal; Imaging (e.g., MRI, CT, CAT, X-Ray); Laparoscopy ; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fat ; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, organ biopsy; Sample, scute; Sample, skin biopsy; Transport; Ultrasound; Weigh	1;2;3;4;5;6	4/10/2019	9/30/2027
		Details: Other = cloacal temperature.ADD and AEP lab trials.												
33	A	Turtle, Kemp's	Range-wide (NMFS Endangered)	Wild	All except	Male and	10	1	Capture/Handle/Release	Net, Tangle	Bycatch reduction experiments; Captive, lab experiments; Epibiota removal; Instrument, drill carapace attachment; Instrument, epoxy attachment; Instrument, suction-cup; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark,	1;2;3;4;5;6	4/10/2019	9/30/2027

		ridley sea	Endangered)		hatchling	Female					oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, scute; Sample, skin biopsy; Tracking; Transport; Ultrasound; Weigh			
		Details: Capture by hand, dip net, hoop net, cast net, pound net (NC only), tangle or seine net, trawl (NC or GoMx only); Other = cloacal temperature. Up to 2 tags per animal.ADD and AEP lab trials.												
34	A	Turtle, Kemp's ridley sea	Range-wide (NMFS Endangered)	Wild	All except hatchling	Male and Female	5	1	Harass/Sampling	Capture under other authority	Bycatch reduction experiments; Captive, lab experiments; Epibiota removal; Instrument, drill carapace attachment; Instrument, epoxy attachment; Instrument, suction-cup; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, scute; Sample, skin biopsy; Tracking; Transport; Ultrasound; Weigh	1;2;3;4;5;6	4/10/2019	9/30/2027
		Details: Other = cloacal temperature. Up to 2 tags per animal.ADD and AEP lab trials.												
											Bycatch reduction experiments; Captive, lab experiments; Epibiota removal; Imaging (e.g., MRI, CT, CAT, X-Ray); Instrument, drill carapace attachment; Instrument, epoxy attachment; Instrument, suction-cup; Laparoscopy ; Lavage, gastric;			

35	A	Turtle, Kemp's ridley sea	Range-wide (NMFS Endangered)	Wild	All except hatchling	Male and Female	10	1	Capture/Handle/Release	Net, Tangle	Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fat ; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, organ biopsy; Sample, scute; Sample, skin biopsy; Tracking; Transport; Ultrasound; Weigh	1;2;3;4;5;6	4/10/2019	9/30/2027
		Details: Capture by hand, dip net, hoop net, cast net, pound net (NC only), tangle or seine net, trawl (NC or GoMx only); Other = cloacal temperature. Up to 2 tags per animal.ADD and AEP lab trials.												
36	A	Turtle, Kemp's ridley sea	Range-wide (NMFS Endangered)	Wild	All except hatchling	Male and Female	5	1	Harass/Sampling	Capture under other authority	Bycatch reduction experiments; Captive, lab experiments; Epibiota removal; Imaging (e.g., MRI, CT, CAT, X-Ray); Instrument, drill carapace attachment; Instrument, epoxy attachment; Instrument, suction-cup; Laparoscopy ; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fat ; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, organ biopsy; Sample, scute; Sample, skin biopsy; Tracking; Transport; Ultrasound; Weigh	1;2;3;4;5;6	4/10/2019	9/30/2027
		Details: Other = cloacal temperature. Up to 2 tags per animal.ADD and AEP lab trials.												

37		Turtle, leatherback sea	Range-wide (NMFS Endangered)	Wild	All except hatchling	Male and Female	4	1	Capture/Handle/Release	Net, breakaway hoopnet	Mark, flipper tag; Mark, PIT tag; Measure; Photograph/Video; Sample, skin biopsy; Transport; Ultrasound; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Capture by hoop net, cast net, pound net (NC only), tangle or seine net, trawl (NC or GoMx only)												
38		Turtle, leatherback sea	Range-wide (NMFS Endangered)	Wild	All except hatchling	Male and Female	5	1	Harass/Sampling	Capture under other authority	Mark, flipper tag; Mark, PIT tag; Measure; Photograph/Video; Sample, skin biopsy; Transport; Ultrasound; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
39		Turtle, leatherback sea	Range-wide (NMFS Endangered)	Wild	All except hatchling	Male and Female	4	1	Capture/Handle/Release	Net, breakaway hoopnet	Instrument, drill carapace attachment; Instrument, suction-cup; Mark, flipper tag; Mark, PIT tag; Measure; Photograph/Video; Sample, skin biopsy; Tracking; Transport; Ultrasound; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Capture by hoop net, cast net, pound net (NC only), tangle or seine net, trawl (NC or GoMx only)												
40		Turtle, leatherback sea	Range-wide (NMFS Endangered)	Wild	All except hatchling	Male and Female	5	1	Harass/Sampling	Capture under other authority	Instrument, drill carapace attachment; Instrument, suction-cup; Mark, flipper tag; Mark, PIT tag; Measure; Photograph/Video; Sample, skin biopsy; Tracking; Transport; Ultrasound; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
41		Turtle, loggerhead sea	Northwest Atlantic Ocean DPS (NMFS Threatened)	Wild	All except hatchling	Male and Female	60	1	Capture/Handle/Release	Net, Tangle	Epibiota removal; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, scute; Sample, skin biopsy; Sample, tears; Transport; Ultrasound; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Capture by hand, hoop net, cast net, pound net (NC only), tangle or seine net, trawl (NC or GoMx only); Other = cloacal temperature/												

42		Turtle, loggerhead sea	Northwest Atlantic Ocean DPS (NMFS Threatened)	Wild	All except hatchling	Male and Female	200	1	Harass/Sampling	Capture under other authority	Epibiota removal; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, scute; Sample, skin biopsy; Sample, tears; Transport; Ultrasound; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Other = cloacal temperature.												
43		Turtle, loggerhead sea	Northwest Atlantic Ocean DPS (NMFS Threatened)	Wild	All except hatchling	Male and Female	30	1	Capture/Handle/Release	Net, Tangle	Epibiota removal; Imaging (e.g., MRI, CT, CAT, X-Ray); Laparoscopy ; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fat ; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, organ biopsy; Sample, scute; Sample, skin biopsy; Sample, tears; Transport; Ultrasound; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Capture by hand, hoop net, cast net, pound net (NC only), tangle or seine net, trawl (NC or GoMx only); Other = cloacal temperature.												
44		Turtle, loggerhead sea	Northwest Atlantic Ocean DPS (NMFS Threatened)	Wild	All except hatchling	Male and Female	25	1	Harass/Sampling	Capture under other authority	Epibiota removal; Imaging (e.g., MRI, CT, CAT, X-Ray); Laparoscopy ; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fat ; Sample, fecal;	1;2;3;4;5;6	8/7/2018	9/30/2027

										Sample, muscle biopsy; Sample, nasal swab; Sample, organ biopsy; Sample, scute; Sample, skin biopsy; Sample, tears; Transport; Ultrasound; Weigh			
		Details: Other = cloacal temperature.												
45		Turtle, loggerhead sea	Northwest Atlantic Ocean DPS (NMFS Threatened)	Wild	All except hatchling	Male and Female	30	1	Capture/Handle/Release	Net, Tangle	Epibiota removal; Instrument, drill carapace attachment; Instrument, epoxy attachment; Instrument, suction-cup; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, scute; Sample, skin biopsy; Sample, tears; Tracking; Transport; Ultrasound; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Capture by hand, hoop net, cast net, pound net (NC only), tangle or seine net, trawl (NC or GoMx only); Other = cloacal temperature. Up to 2 tags per animal.												
46		Turtle, loggerhead sea	Northwest Atlantic Ocean DPS (NMFS Threatened)	Wild	All except hatchling	Male and Female	30	1	Handle/Release	Capture under other authority	Epibiota removal; Instrument, drill carapace attachment; Instrument, epoxy attachment; Instrument, suction-cup; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, scute; Sample, skin biopsy; Sample, tears;	1;2;3;4;5;6	8/7/2018	9/30/2027

											Tracking; Transport; Ultrasound; Weigh			
		Details: Other = cloacal temperature. Up to 2 tags per animal.												
47		Turtle, loggerhead sea	Northwest Atlantic Ocean DPS (NMFS Threatened)	Wild	All except hatchling	Male and Female	20	1	Capture/Handle/Release	Net, Tangle	Epibiota removal; Imaging (e.g., MRI, CT, CAT, X-Ray); Instrument, drill carapace attachment; Instrument, epoxy attachment; Instrument, suction-cup; Laparoscopy ; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fat ; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, organ biopsy; Sample, scute; Sample, skin biopsy; Sample, tears; Tracking; Transport; Ultrasound; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Capture by hand, hoop net, cast net, pound net (NC only), tangle or seine net, trawl (NC or GoMx only); Other = cloacal temperature.												
48		Turtle, loggerhead sea	Northwest Atlantic Ocean DPS (NMFS Threatened)	Wild	All except hatchling	Male and Female	10	1	Harass/Sampling	Capture under other authority	Epibiota removal; Imaging (e.g., MRI, CT, CAT, X-Ray); Instrument, drill carapace attachment; Instrument, epoxy attachment; Instrument, suction-cup; Laparoscopy ; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fat ; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample,	1;2;3;4;5;6	8/7/2018	9/30/2027

											organ biopsy; Sample, scute; Sample, skin biopsy; Sample, tears; Tracking; Transport; Ultrasound; Weigh			
		Details: Other = cloacal temperature. Up to 2 tags per animal.												
49		Turtle, loggerhead sea	Northwest Atlantic Ocean DPS (NMFS Threatened)	Wild	All except hatchling	Male and Female	10	1	Capture/Handle/Release	Net, Tangle	Epibiota removal; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, scute; Sample, skin biopsy; Transport; Ultrasound; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Capture by hand, dip net, hoop net, cast net, pound net (NC only), tangle or seine net, trawl (NC or GoMx only); Other = cloacal temperature.												
50	A	Turtle, loggerhead sea	Northwest Atlantic Ocean DPS (NMFS Threatened)	Wild	All except hatchling	Male and Female	50	1	Harass/Sampling	Capture under other authority	Bycatch reduction experiments; Captive, lab experiments; Epibiota removal; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, scute; Sample, skin biopsy; Transport; Ultrasound; Weigh	1;2;3;4;5;6	4/10/2019	9/30/2027
		Details: Other = cloacal temperature. ADD and AEP lab trials.												
											Bycatch reduction experiments; Captive, lab experiments; Epibiota removal; Imaging (e.g., MRI, CT, CAT, X-Ray); Laparoscopy ; Lavage, gastric;			

51	A	Turtle, loggerhead sea	Northwest Atlantic Ocean DPS (NMFS Threatened)	Wild	All except hatchling	Male and Female	15	1	Capture/Handle/Release	Net, Tangle	Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fat ; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, organ biopsy; Sample, scute; Sample, skin biopsy; Transport; Ultrasound; Weigh	1;2;3;4;5;6	4/10/2019	9/30/2027
		Details: Capture by hand, dip net, hoop net, cast net, pound net (NC or GoMx only), tangle or seine net, trawl (NC only); Other = cloacal temperature.ADD and AEP lab trials.												
52	A	Turtle, loggerhead sea	Northwest Atlantic Ocean DPS (NMFS Threatened)	Wild	All except hatchling	Male and Female	10	1	Harass/Sampling	Capture under other authority	Bycatch reduction experiments; Captive, lab experiments; Epibiota removal; Imaging (e.g., MRI, CT, CAT, X-Ray); Laparoscopy ; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fat ; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, organ biopsy; Sample, scute; Sample, skin biopsy; Transport; Ultrasound; Weigh	1;2;3;4;5;6	4/10/2019	9/30/2027
		Details: Other = cloacal temperature.ADD and AEP lab trials.												
											Bycatch reduction experiments; Captive, lab experiments; Epibiota removal; Instrument, drill carapace attachment; Instrument, epoxy attachment; Instrument, suction-cup; Lavage, gastric; Mark,			

53	A	Turtle, loggerhead sea	Northwest Atlantic Ocean DPS (NMFS Threatened)	Wild	All except hatchling	Male and Female	15	1	Capture/Handle/Release	Net, Tangle	carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, scute; Sample, skin biopsy; Tracking; Transport; Ultrasound; Weigh	1;2;3;4;5;6	4/10/2019	9/30/2027
		Details: Capture by hand, dip net, hoop net, cast net, pound net (NC only), tangle or seine net, trawl (NC or GoMx only); Other = cloacal temperature. Up to 2 tags per animal.ADD and AEP lab trials.												
54	A	Turtle, loggerhead sea	Northwest Atlantic Ocean DPS (NMFS Threatened)	Wild	All except hatchling	Male and Female	15	1	Harass/Sampling	Capture under other authority	Bycatch reduction experiments; Captive, lab experiments; Epibiota removal; Instrument, drill carapace attachment; Instrument, epoxy attachment; Instrument, suction-cup; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, scute; Sample, skin biopsy; Tracking; Transport; Ultrasound; Weigh	1;2;3;4;5;6	4/10/2019	9/30/2027
		Details: Other = cloacal temperature. Up to 2 tags per animal.ADD and AEP lab trials.												
											Bycatch reduction experiments; Captive, lab experiments; Epibiota removal; Imaging (e.g., MRI, CT, CAT, X-Ray); Instrument, drill carapace attachment; Instrument, epoxy attachment;			

55	A	Turtle, loggerhead sea	Northwest Atlantic Ocean DPS (NMFS Threatened)	Wild	All except hatchling	Male and Female	10	1	Capture/Handle/Release	Net, Tangle	Instrument, suction-cup; Laparoscopy ; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fat ; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, organ biopsy; Sample, scute; Sample, skin biopsy; Tracking; Transport; Ultrasound; Weigh	1;2;3;4;5;6	4/10/2019	9/30/2027
		Details: Capture by hand, dip net, hoop net, cast net, pound net (NC only), tangle or seine net, trawl (NC or GoMx only); Other = cloacal temperature; Up to 2 tags per animal.ADD and AEP lab trials.												
56	A	Turtle, loggerhead sea	Northwest Atlantic Ocean DPS (NMFS Threatened)	Wild	All except hatchling	Male and Female	5	1	Harass/Sampling	Capture under other authority	Bycatch reduction experiments; Captive, lab experiments; Epibiota removal; Imaging (e.g., MRI, CT, CAT, X-Ray); Instrument, drill carapace attachment; Instrument, epoxy attachment; Instrument, suction-cup; Laparoscopy ; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fat ; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, organ biopsy; Sample, scute; Sample, skin biopsy; Tracking; Transport; Ultrasound; Weigh	1;2;3;4;5;6	4/10/2019	9/30/2027
		Details: Other = cloacal temperature; Up to 2 tags per animal.ADD and AEP lab trials.												

57		Turtle, olive ridley sea	Range-wide (NMFS Threatened)	Wild	All except hatchling	Male and Female	6	1	Capture/Handle/Release	Net, Tangle	Epibiota removal; Instrument, drill carapace attachment; Instrument, epoxy attachment; Instrument, suction-cup; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, scute; Sample, skin biopsy; Sample, tears; Tracking; Transport; Ultrasound; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Capture by hand, hoop net, cast net, pound net (NC only), tangle or seine net, trawl (NC or GoMx only); Other = cloacal temperature. Up to 2 tags per animal.												
58		Turtle, olive ridley sea	Range-wide (NMFS Threatened)	Wild	All except hatchling	Male and Female	5	1	Harass/Sampling	Capture under other authority	Epibiota removal; Instrument, drill carapace attachment; Instrument, epoxy attachment; Instrument, suction-cup; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, scute; Sample, skin biopsy; Sample, tears; Tracking; Transport; Ultrasound; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Other = cloacal temperature. Up to 2 tags per animal.												

59		Turtle, unidentified sea	NA (NMFS Endangered)	Wild	All except hatchling	Male and Female	3	1	Capture/Handle/Release	Net, Tangle	Epibiota removal; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, scute; Sample, skin biopsy; Sample, tears; Transport; Ultrasound; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Capture by hand, hoop net, cast net, pound net (NC only), tangle or seine net, trawl (NC or GoMx only); Other = cloacal temperature.											
60		Turtle, unidentified sea	NA (NMFS Endangered)	Wild	All except hatchling	Male and Female	3	1	Harass/Sampling	Capture under other authority	Epibiota removal; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, scute; Sample, skin biopsy; Sample, tears; Transport; Ultrasound; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Other = cloacal temperature											
61		Turtle, unidentified sea	NA (NMFS Endangered)	Wild	All except hatchling	Male and Female	2	1	Capture/Handle/Release	Net, Tangle	Epibiota removal; Imaging (e.g., MRI, CT, CAT, X-Ray); Laparoscopy ; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fat ; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, organ biopsy; Sample, scute; Sample, skin biopsy; Sample,	1;2;3;4;5;6	8/7/2018	9/30/2027

											tears; Transport; Ultrasound; Weigh			
		Details: Capture by hand, hoop net, cast net, pound net (NC only), tangle or seine net, trawl (NC or GoMx only); Other = cloacal temperature.												
62		Turtle, unidentified sea	NA (NMFS Endangered)	Wild	All except hatchling	Male and Female	1	1	Harass/Sampling	Capture under other authority	Epibiota removal; Imaging (e.g., MRI, CT, CAT, X-Ray); Laparoscopy ; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fat ; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, organ biopsy; Sample, scute; Sample, skin biopsy; Sample, tears; Transport; Ultrasound; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Other = cloacal temperature												
63		Turtle, unidentified sea	NA (NMFS Endangered)	Wild	All except hatchling	Male and Female	3	1	Capture/Handle/Release	Net, Tangle	Epibiota removal; Instrument, drill carapace attachment; Instrument, epoxy attachment; Instrument, suction-cup; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, scute; Sample, skin biopsy; Sample, tears; Tracking; Transport; Ultrasound; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Capture by hand, hoop net, cast net, pound net (NC only), tangle or seine net, trawl (NC or GoMx only); Other = cloacal temperature. Up to 2 tags per animal.												

64		Turtle, unidentified sea	NA (NMFS Endangered)	Wild	All except hatchling	Male and Female	3	1	Harass/Sampling	Capture under other authority	Epibiota removal; Instrument, drill carapace attachment; Instrument, epoxy attachment; Instrument, suction-cup; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, scute; Sample, skin biopsy; Sample, tears; Tracking; Transport; Ultrasound; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Other = cloacal temperature. Up to 2 tags per animal.												
65		Turtle, unidentified sea	NA (NMFS Endangered)	Wild	All except hatchling	Male and Female	2	1	Capture/Handle/Release	Net, Tangle	Epibiota removal; Imaging (e.g., MRI, CT, CAT, X-Ray); Instrument, drill carapace attachment; Instrument, epoxy attachment; Instrument, suction-cup; Laparoscopy ; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fat ; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, organ biopsy; Sample, scute; Sample, skin biopsy; Sample, tears; Tracking; Transport; Ultrasound; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Capture by hand, hoop net, cast net, pound net (NC only), tangle or seine net, trawl (NC or GoMx only); Other = cloacal temperature. Up to 2 tags per animal.												

66		Turtle, unidentified sea	NA (NMFS Endangered)	Wild	All except hatchling	Male and Female	1	1	Harass/Sampling	Capture under other authority	Epibiota removal; Imaging (e.g., MRI, CT, CAT, X-Ray); Instrument, drill carapace attachment; Instrument, epoxy attachment; Instrument, suction-cup; Laparoscopy ; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, oxytetracycline; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fat ; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, organ biopsy; Sample, scute; Sample, skin biopsy; Sample, tears; Tracking; Transport; Ultrasound; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Other = cloacal temperature. Up to 2 tags per animal.												
67		Turtle, green sea	Range-wide (NMFS Endangered/Threatened)	Wild	All except hatchling	Male and Female	20	1	Harass	Survey, aerial/vessel	Count/survey; Photograph/Video; Remote vehicle, aerial (fixed wing); Remote vehicle, aerial (VTOL)	N/A	8/7/2018	9/30/2027
		Details: Pursue > 5 minutes without capture. One UAS during vessel surveys.												
68		Turtle, Kemp's ridley sea	Range-wide (NMFS Endangered)	Wild	All except hatchling	Male and Female	20	1	Harass	Survey, aerial/vessel	Count/survey; Photograph/Video; Remote vehicle, aerial (fixed wing); Remote vehicle, aerial (VTOL)	N/A	8/7/2018	9/30/2027
		Details: Pursue > 5 minutes without capture. One UAS during vessel surveys.												
69		Turtle, loggerhead sea	Range-wide (NMFS Threatened)	Wild	All except hatchling	Male and Female	20	1	Harass	Survey, aerial/vessel	Count/survey; Photograph/Video; Remote vehicle, aerial (fixed wing); Remote vehicle, aerial (VTOL)	N/A	8/7/2018	9/30/2027
		Details: Pursue > 5 minutes without capture. One UAS during vessel surveys.												

Location

Research Area: Atlantic Ocean **States:** AL,CT,DE,FL,GA,LA,MA,MD,ME,MS,NC,NH,NJ,NY,PR,RI,SC,TX,VA,VI **Stream Name:** North Atlantic Ocean, Gulf of Mexico, Caribbean Sea, embayments and tributaries

Location Description: Abundance, Health Demographic and Behavior Studies in the North Atlantic, Gulf of Mexico and Caribbean Sea – Miami Laboratory

Take Information

Line	Ver	Species	Listing Unit/Stock	Production /Origin	Life Stage	Sex	Expected Take	Takes Per Animal	Take Action	Observe /Collect Method	Procedure	Transport Record	Begin Date	End Date
1		Turtle, green sea	North Atlantic DPS (NMFS Threatened)	Wild	All except hatchling	Male and Female	200	1	Capture/Handle/Release	Hand	Mark, carapace (temporary); Mark, flipper tag; Mark, PIT tag; Measure; Photograph/Video; Sample, blood; Sample, skin biopsy; Transport; Ultrasound; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Capture by hand, dipnet, hoop net, or cast net												
2		Turtle, green sea	North Atlantic DPS (NMFS Threatened)	Wild	All except hatchling	Male and Female	60	1	Capture/Handle/Release	Hand	Epibiota removal; Instrument, drill carapace attachment; Instrument, epoxy attachment; Instrument, suction-cup; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, PIT tag; Measure; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, skin biopsy; Tracking; Transport; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Capture by hand, dipnet, hoop net, or cast net. Up to 2 tags per animal.												
3		Turtle, green sea	North Atlantic DPS (NMFS Threatened)	Wild	All except hatchling	Male and Female	10	1	Capture/Handle/Release	Net, trawl	Epibiota removal; Instrument, drill carapace attachment; Instrument, epoxy attachment; Instrument, suction-cup; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, PIT tag; Measure; Photograph/Video; Sample, blood; Sample, cloacal	1;2;3;4;5;6	8/7/2018	9/30/2027

										swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, skin biopsy; Tracking; Transport; Weigh			
		Details: Only in NC or GoMx waters. Up to 2 tags per animal.												
4		Turtle, green sea	North Atlantic DPS (NMFS Threatened)	Wild	All except hatchling	Male and Female	25	1	Harass/Sampling	Capture under other authority	Epibiota removal; Instrument, drill carapace attachment; Instrument, epoxy attachment; Instrument, suction-cup; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, PIT tag; Measure; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, skin biopsy; Tracking; Transport; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Up to 2 tags per animal.												
5		Turtle, hawksbill sea	Range-wide (NMFS Endangered)	Wild	All except hatchling	Male and Female	60	1	Capture/Handle/Release	Hand	Mark, carapace (temporary); Mark, flipper tag; Mark, PIT tag; Measure; Photograph/Video; Sample, blood; Sample, skin biopsy; Transport; Ultrasound; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Capture by hand, dipnet, hoop net, or cast net												
6		Turtle, hawksbill sea	Range-wide (NMFS Endangered)	Wild	All except hatchling	Male and Female	22	1	Capture/Handle/Release	Hand	Epibiota removal; Instrument, drill carapace attachment; Instrument, epoxy attachment; Instrument, suction-cup; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, PIT tag; Measure; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, skin biopsy; Tracking; Transport; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027

		Details: Capture by hand, dipnet, hoop net, or cast net. Up to 2 tags per animal.												
7		Turtle, hawksbill sea	Range-wide (NMFS Endangered)	Wild	All except hatchling	Male and Female	2	1	Capture/Handle/Release	Net, trawl	Epibiota removal; Instrument, drill carapace attachment; Instrument, epoxy attachment; Instrument, suction-cup; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, PIT tag; Measure; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, skin biopsy; Tracking; Transport; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Capture by trawl only in NC or GoMx waters. Up to 2 tags per animal.												
8		Turtle, hawksbill sea	Range-wide (NMFS Endangered)	Wild	All except hatchling	Male and Female	10	1	Harass/Sampling	Capture under other authority	Epibiota removal; Instrument, drill carapace attachment; Instrument, epoxy attachment; Instrument, suction-cup; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, PIT tag; Measure; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, skin biopsy; Tracking; Transport; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Up to 2 tags per animal.												
9		Turtle, Kemp's ridley sea	Range-wide (NMFS Endangered)	Wild	All except hatchling	Male and Female	120	1	Capture/Handle/Release	Hand	Mark, carapace (temporary); Mark, flipper tag; Mark, PIT tag; Measure; Photograph/Video; Sample, blood; Sample, skin biopsy; Transport; Ultrasound; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Capture by hand, dipnet, hoop net, or cast net												

10		Turtle, Kemp's ridley sea	Range-wide (NMFS Endangered)	Wild	All except hatchling	Male and Female	40	1	Capture/Handle/Release	Hand	Epibiota removal; Instrument, drill carapace attachment; Instrument, epoxy attachment; Instrument, suction-cup; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, PIT tag; Measure; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, skin biopsy; Tracking; Transport; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Capture by hand, dipnet, hoop net, or cast net.Up to 2 tags per animal.											
11		Turtle, Kemp's ridley sea	Range-wide (NMFS Endangered)	Wild	All except hatchling	Male and Female	10	1	Capture/Handle/Release	Net, trawl	Epibiota removal; Instrument, drill carapace attachment; Instrument, epoxy attachment; Instrument, suction-cup; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, PIT tag; Measure; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, skin biopsy; Tracking; Transport; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Capture by trawl in NC or GoMx waters only. Up to 2 tags per animal.											
12		Turtle, Kemp's ridley sea	Range-wide (NMFS Endangered)	Wild	All except hatchling	Male and Female	25	1	Harass/Sampling	Capture under other authority	Epibiota removal; Instrument, drill carapace attachment; Instrument, epoxy attachment; Instrument, suction-cup; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, PIT tag; Measure; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, skin biopsy;	1;2;3;4;5;6	8/7/2018	9/30/2027

											Tracking; Transport; Weigh			
		Details: Up to 2 tags per animal.												
13		Turtle, loggerhead sea	Northwest Atlantic Ocean DPS (NMFS Threatened)	Wild	All except hatchling	Male and Female	145	1	Capture/Handle/Release	Hand	Mark, carapace (temporary); Mark, flipper tag; Mark, PIT tag; Measure; Photograph/Video; Sample, blood; Sample, skin biopsy; Transport; Ultrasound; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Capture by hand, dipnet, hoop net, or cast net												
14		Turtle, loggerhead sea	Northwest Atlantic Ocean DPS (NMFS Threatened)	Wild	All except hatchling	Male and Female	60	1	Capture/Handle/Release	Hand	Epibiota removal; Instrument, drill carapace attachment; Instrument, epoxy attachment; Instrument, suction-cup; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, PIT tag; Measure; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, skin biopsy; Tracking; Transport; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Capture by hand, dipnet, hoop net, or cast net. Up to 2 tags per animal.												
15		Turtle, loggerhead sea	Northwest Atlantic Ocean DPS (NMFS Threatened)	Wild	All except hatchling	Male and Female	10	1	Capture/Handle/Release	Net, trawl	Epibiota removal; Instrument, drill carapace attachment; Instrument, epoxy attachment; Instrument, suction-cup; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, PIT tag; Measure; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, skin biopsy; Tracking; Transport; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: In NC or GoMx waters only. Up to 2 tags per animal.												

16		Turtle, loggerhead sea	Northwest Atlantic Ocean DPS (NMFS Threatened)	Wild	All except hatchling	Male and Female	50	1	Harass/Sampling	Capture under other authority	Epibiota removal; Instrument, drill carapace attachment; Instrument, epoxy attachment; Instrument, suction-cup; Lavage, gastric; Mark, carapace (temporary); Mark, flipper tag; Mark, PIT tag; Measure; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, skin biopsy; Tracking; Transport; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Up to 2 tags per animal.											
17		Turtle, leatherback sea	Range-wide (NMFS Endangered)	Wild	All except hatchling	Male and Female	50	1	Capture/Handle/Release	Net, breakaway hoopnet	Mark, flipper tag; Mark, PIT tag; Measure; Photograph/Video; Sample, blood; Sample, skin biopsy; Transport; Ultrasound; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Capture by hand, dipnet, hoop net, or cast net											
18		Turtle, leatherback sea	Range-wide (NMFS Endangered)	Wild	All except hatchling	Male and Female	50	1	Capture/Handle/Release	Net, breakaway hoopnet	Instrument, drill carapace attachment; Instrument, suction-cup; Mark, flipper tag; Mark, PIT tag; Measure; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, skin biopsy; Tracking; Transport; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Capture by hand, dipnet, hoop net, or cast net.Up to 2 tags per animal.											
19		Turtle, leatherback sea	Range-wide (NMFS Endangered)	Wild	All except hatchling	Male and Female	2	1	Capture/Handle/Release	Net, trawl	Instrument, drill carapace attachment; Instrument, suction-cup; Mark, flipper tag; Mark, PIT tag; Measure; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, skin biopsy; Tracking;	1;2;3;4;5;6	8/7/2018	9/30/2027

											Transport; Weigh			
		Details: NC or GoMx waters only. Up to 2 tags per animal.												
20		Turtle, leatherback sea	Range-wide (NMFS Endangered)	Wild	All except hatchling	Male and Female	25	1	Harass/Sampling	Capture under other authority	Instrument, drill carapace attachment; Instrument, suction-cup; Mark, flipper tag; Mark, PIT tag; Measure; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, muscle biopsy; Sample, nasal swab; Sample, skin biopsy; Tracking; Transport; Weigh	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Up to 2 tags per animal.												
21		Turtle, green sea	Range-wide (NMFS Endangered/Threatened)	Wild	All except hatchling	Male and Female	100	1	Harass	Survey, aerial/vessel	Count/survey; Photograph/Video; Remote vehicle, aerial (fixed wing); Remote vehicle, aerial (VTOL)	N/A	8/7/2018	9/30/2027
		Details: pursue > 5 minutes without capture; one UAS at a time deployed during vessel-based surveys												
22		Turtle, hawksbill sea	Range-wide (NMFS Endangered)	Wild	All except hatchling	Male and Female	5	1	Harass	Survey, aerial/vessel	Count/survey; Photograph/Video; Remote vehicle, aerial (fixed wing); Remote vehicle, aerial (VTOL)	N/A	8/7/2018	9/30/2027
		Details: pursue > 5 minutes without capture; one UAS at a time deployed during vessel-based surveys												
23		Turtle, Kemp's ridley sea	Range-wide (NMFS Endangered)	Wild	All except hatchling	Male and Female	20	1	Harass	Survey, aerial/vessel	Count/survey; Photograph/Video; Remote vehicle, aerial (fixed wing); Remote vehicle, aerial (VTOL)	N/A	8/7/2018	9/30/2027
		Details: pursue > 5 minutes without capture; one UAS at a time deployed during vessel-based surveys												
24		Turtle, loggerhead sea	Northwest Atlantic Ocean DPS (NMFS Threatened)	Wild	All except hatchling	Male and Female	50	1	Harass	Survey, aerial/vessel	Count/survey; Photograph/Video; Remote vehicle, aerial (fixed wing); Remote vehicle, aerial (VTOL)	N/A	8/7/2018	9/30/2027
		Details: pursue > 5 minutes without capture; one UAS at a time deployed during vessel-based surveys												
25		Turtle, leatherback sea	Range-wide (NMFS Endangered)	Wild	All except hatchling	Male and Female	100	1	Harass	Survey, aerial/vessel	Count/survey; Photograph/Video; Remote vehicle, aerial (fixed wing); Remote vehicle, aerial (VTOL)	N/A	8/7/2018	9/30/2027
		Details: pursue > 5 minutes without capture; one UAS at a time deployed during vessel-based surveys												

26		Turtle, unidentified sea	NA (NMFS Endangered/Threatened)	Wild	All except hatchling	Male and Female	5	1	Capture/Handle/Release	Hand	Mark, carapace (temporary); Mark, flipper tag; Mark, PIT tag; Measure; Photograph/Video; Sample, blood; Sample, skin biopsy; Transport; Ultrasound; Weigh	N/A	8/7/2018	9/30/2027
		Details: Capture by hand, dip net, hoop net, or cast net												

Location

Research Area: Atlantic Ocean **States:** AL,CT,DE,FL,GA,LA,MA,MD,ME,MS,NC,NH,NJ,NY,PR,RI,SC,TX,VA,VI **Stream Name:** North Atlantic Ocean, Gulf of Mexico, Caribbean Sea, embayments and tributaries
Location Description: Incidental mortalities

Take Information

Line	Ver	Species	Listing Unit/Stock	Production /Origin	Life Stage	Sex	Expected Take	Takes Per Animal	Take Action	Observe /Collect Method	Procedure	Transport Record	Begin Date	End Date
1		Turtle, loggerhead sea	Northwest Atlantic Ocean DPS (NMFS Threatened)	Wild	Juvenile/ Subadult/ Adult	Male and Female	2	1	Unintentional mortality	Other	Salvage (carcass, tissue, parts); Unintentional mortality	1;2;3;4;5;6	8/7/2018	9/30/2027
		Details: Accidental death over life of permit due to capture (hoop, cast, pound, tangle, seine, or trawl net) or during procedures.												
2		Turtle, green sea	North Atlantic DPS (NMFS Threatened)	Wild	Juvenile/ Subadult/ Adult	Male and Female	2	1	Unintentional mortality	Other	Salvage (carcass, tissue, parts); Unintentional mortality	N/A	8/7/2018	9/30/2027
		Details: Accidental death over life of permit due to capture (hoop, cast, pound, tangle, seine, or trawl net) or during procedures.												
3		Turtle, Kemp's ridley sea	Range-wide (NMFS Endangered)	Wild	Juvenile/ Subadult/ Adult	Male and Female	2	1	Unintentional mortality	Other	Salvage (carcass, tissue, parts); Unintentional mortality	N/A	8/7/2018	9/30/2027
		Details: Accidental death over life of permit due to capture (hoop, cast, pound, tangle, seine, or trawl net) or during procedures.												
4		Turtle, leatherback sea	Range-wide (NMFS Endangered)	Wild	Juvenile/ Subadult/ Adult	Male and Female	1	1	Unintentional mortality	Other	Salvage (carcass, tissue, parts); Unintentional mortality	N/A	8/7/2018	9/30/2027
		Details: Accidental death over life of permit due to capture (hoop, cast, pound, tangle, seine, or trawl net) or during procedures.												
5		Turtle, hawksbill sea	Range-wide (NMFS Endangered)	Wild	Juvenile/ Subadult/ Adult	Male and Female	1	1	Unintentional mortality	Other	Salvage (carcass, tissue, parts); Unintentional mortality	N/A	8/7/2018	9/30/2027
		Details: Accidental death over life of permit due to capture (hoop, cast, pound, tangle, seine, or trawl net) or during procedures.												

6		Turtle, olive ridley sea	Range-wide (NMFS Threatened)	Wild	Juvenile/ Subadult/ Adult	Male and Female	1	1	Unintentional mortality	Other	Salvage (carcass, tissue, parts); Unintentional mortality	N/A	8/7/2018	9/30/2027
	Details: Accidental death over life of permit due to capture (hoop, cast, pound, tangle, seine, or trawl net) or during procedures.													

Transport Information

1.

Mode(s) of Transportation: Turtles will be transported in individual containers within an enclosed climate-controlled van or truck.

Transportation Company: N/A

Maximum amount of time between capture and arrival: Transfer time from capture site to initial holding facility will not exceed 3 hours, and transfer time to a permanent holding facility (if necessary) will not exceed 3 hours (with a potential maximum of 5 hours when transporting across Florida).

Container Description: The shipping container (plastic, wood, fiberglass) will have sides tall enough to contain the turtle and will contain a moist foam pad or sand (for hatchlings).

Special Care: The carapace and head of the turtle will be covered with a wet towel and misted with fresh or salt water to prevent desiccation of skin and eyes when ambient conditions allow. Otherwise, water based or petroleum jelly will be used on skin and carapace.

Accompanying Personnel Qualifications: Experienced personnel will accompany the turtle under the advisement of a veterinarian.

Facility Title: Karen Beasley Sea Turtle Rescue and Rehabilitation Center

Facility Affiliation/Organization:

Address: Topsail Island, NC 28460 UNITED STATES

Phone Number:

Containment Method: see attached file for details

Final Disposition: released when healthy.

2.

Mode(s) of Transportation: Turtles will be transported in individual containers within an enclosed climate-controlled van or truck.

Transportation Company: N/A

Maximum amount of time between capture and arrival: Transfer time from capture site to initial holding facility will not exceed 3 hours, and transfer time to a permanent holding facility (if necessary) will not exceed 3 hours (with a potential maximum of 5 hours when transporting across Florida).

Container Description: The shipping container (plastic, wood, fiberglass) will have sides tall enough to contain the turtle and will contain a moist foam pad or sand (for hatchlings).

Special Care: The carapace and head of the turtle will be covered with a wet towel and misted with fresh or salt water to prevent desiccation of skin and eyes when ambient conditions allow. Otherwise, water based or petroleum jelly will be used on skin and carapace.

Accompanying Personnel Qualifications:	Experienced personnel will accompany the turtle under the advisement of a veterinarian.
Facility Title:	NOAA Galveston Sea Turtle Facility
Facility Affiliation/Organization:	
Address:	Galveston, TX UNITED STATES
Phone Number:	(409)771-7247 ext.
Containment Method:	see attached file for details
Final Disposition:	Released when healthy as determined by attending veterinarian.

3.

Mode(s) of Transportation:	Turtles will be transported in individual containers within an enclosed climate-controlled van or truck.
Transportation Company:	N/A
Maximum amount of time between capture and arrival:	Transfer time from capture site to initial holding facility will not exceed 3 hours, and transfer time to a permanent holding facility (if necessary) will not exceed 3 hours (with a potential maximum of 5 hours when transporting across Florida).
Container Description:	The shipping container (plastic, wood, fiberglass) will have sides tall enough to contain the turtle and will contain a moist foam pad or sand (for hatchlings).
Special Care:	The carapace and head of the turtle will be covered with a wet towel and misted with fresh or salt water to prevent desiccation of skin and eyes when ambient conditions allow. Otherwise, water based or petroleum jelly will be used on skin and carapace.
Accompanying Personnel Qualifications:	Experienced personnel will accompany the turtle under the advisement of a veterinarian
Facility Title:	Marinelife Center of Juno Beach
Facility Affiliation/Organization:	
Address:	Juno Beach, FL 33408 UNITED STATES
Phone Number:	
Containment Method:	see attached file for details
Final Disposition:	Released when healthy as determined by attending veterinarian.

4.

Mode(s) of Transportation:	Turtles will be transported in individual containers within an enclosed climate-controlled van or truck.
Transportation Company:	N/A

Maximum amount of time between capture and arrival:	Transfer time from capture site to initial holding facility will not exceed 3 hours, and transfer time to a permanent holding facility (if necessary) will not exceed 3 hours (with a potential maximum of 5 hours when transporting across Florida).
Container Description:	The shipping container (plastic, wood, fiberglass) will have sides tall enough to contain the turtle and will contain a moist foam pad or sand (for hatchlings).
Special Care:	The carapace and head of the turtle will be covered with a wet towel and misted with fresh or salt water to prevent desiccation of skin and eyes when ambient conditions allow. Otherwise, water based or petroleum jelly will be used on skin and carapace.
Accompanying Personnel Qualifications:	Experienced personnel will accompany the turtle under the advisement of a veterinarian.
Facility Title:	Gumbo Limbo Nature Center
Facility Affiliation/Organization:	
Address:	Boca Raton, FL 33432 UNITED STATES
Phone Number:	
Containment Method:	see attached file for details
Final Disposition:	Released when healthy as determined by attending veterinarian.

5.

Mode(s) of Transportation:	Turtles will be transported in individual containers within an enclosed climate-controlled van or truck.
Transportation Company:	N/A
Maximum amount of time between capture and arrival:	Transfer time from capture site to initial holding facility will not exceed 3 hours, and transfer time to a permanent holding facility (if necessary) will not exceed 3 hours.
Container Description:	The shipping container (plastic, wood, fiberglass) will have sides tall enough to contain the turtle and will contain a moist foam pad or sand (for hatchlings).
Special Care:	The carapace and head of the turtle will be covered with a wet towel and misted with fresh or salt water to prevent desiccation of skin and eyes when ambient conditions allow. Otherwise, water based or petroleum jelly will be used on skin and carapace.
Accompanying Personnel Qualifications:	Experienced personnel will accompany the turtle under the advisement of a veterinarian.
Facility Title:	NMFS Beaufort Laboratory
Facility Affiliation/Organization:	
Address:	Beaufort, NC 28516 UNITED STATES
Phone Number:	
Containment Method:	Held on cushioned surface in laboratory
Final Disposition:	Released when healthy as determined by attending veterinarian or directly after procedures.

6.	**Mode(s) of Transportation:**	Turtles will be transported in individual containers within an enclosed climate-controlled van or truck.
	Transportation Company:	N/A
	Maximum amount of time between capture and arrival:	Transfer time from capture site to initial holding facility will not exceed 3 hours, and transfer time to a permanent holding facility (if necessary) will not exceed 3 hours.
	Container Description:	The shipping container (plastic, wood, fiberglass) will have sides tall enough to contain the turtle and will contain a moist foam pad.
	Special Care:	The carapace and head of the turtle will be covered with a wet towel and misted with fresh or salt water to prevent desiccation of skin and eyes when ambient conditions allow. Otherwise, water based or petroleum jelly will be used on skin and carapace.
	Accompanying Personnel Qualifications:	Experienced personnel will accompany the turtle under the advisement of a veterinarian.
	Facility Title:	NCSU College of Veterinary Medicine
	Facility Affiliation/Organization:	
	Address:	Morehead City, NC 28557 UNITED STATES
	Phone Number:	
	Containment Method:	Held on cushioned surface in surgical facility
	Final Disposition:	Released when healthy as determined by attending veterinarian.

NEPA Checklist

1) If your activities will involve equipment (e.g., scientific instruments) or techniques that are new, untested,or otherwise have unknown or uncertain impacts on the biological or physical environment , please discuss the degree to which they are likely to be adopted by others for similar activities or applied more broadly.

None of the activities that we propose conducting are new, innovative, or experimental. All of these activities have been conducted in the past with little or no detrimental effect to sea turtles. The neonate satellite transmitter attachment method has been thoroughly tested for loggerheads and proven to be safe. As new attachment methods or methods for additional species are developed, these methods will be thoroughly tested to assess safety and approved before using any new methodology on wild-captured turtles.

2) If your activities involve collecting, handling, or transporting potentially infectious agents or pathogens (e.g., biological specimens such as live animals or blood), or using or transporting hazardous substances (e.g., toxic chemicals), provide a description of the protocols you will use to ensure public health and human safety are not adversely affected, such as by spread of zoonotic diseases or contamination of food or water supplies.

Our activities involve the collection, handling and transport of biological samples from sea turtles. All samples will be collected, handled, stored, and shipped in such a manner as to ensure human safety from injury or zoonotic disease transmission as well as provide for the protection of the sea turtles. Although transmission of zoonitics from sea turtles to humans is rare, due to this possibility, researchers will wear appropriate PPE (e.g., disposable gloves) when possible and will decontaminate after handling turtles (e.g., hand washing with soap or use of alcohol-based hand sanitizer). Tissue biopsy samples to be used for genetic analysis will be stored in saturated NaCl solution, or in rare cases, dimethyl sulfoxide (DMSO), a non-toxic solution contained within sealed vials. All other tissue types will be stored frozen at either -20 or -80º C. All animals will be handled in accordance with defined careful handling protocols designed to minimize injury risk to the researcher. Gloves will be worn and aseptic practices followed when sampling turtles to minimize risks of transmitting any pathogens.

3) Describe the physical characteristics of your project location, including whether you will be working in or near unique geographic areas such as state or National Marine Sanctuaries,

Marine Protected Areas, Parks or Wilderness Areas, Wildlife Refuges, Wild and Scenic Rivers, designated Critical Habitat for endangered or threatened species, Essential Fish Habitat, etc. Discuss how your activities could impact the physical environment, such as by direct alteration of substrate during use of bottom trawls, setting nets, anchoring vessels or buoys, erecting blinds or other structures, or ingress and egress of researchers, and measures you will take to minimize these impacts.

Please see attached file for details.

4) Briefly describe important scientific, cultural, or historic resources (e.g., archeological resources, animals used for subsistence, sites listed in or eligible for listing in the National Register of Historic Places) in your project area and discuss measures you will take to ensure your work does not cause loss or destruction of such resources. If your activity will target marine mammals in Alaska or Washington, discuss measures you will take to ensure your project does not adversely affect the availability (e.g., distribution, abundance) or suitability (e.g., food safety) of these animals for subsistence uses.

OOur proposed actions will not affect entities listed in or eligible for listing in the National Register of Historic Places, or cause loss or destruction of scientific, cultural, or historic resources.

5) Discuss whether your project involves activities known or suspected of introducing or spreading invasive species, intentionally or not, (e.g., transporting animals or tissues, discharging ballast water, use of equipment at multiple sites). Describe measures you would take to prevent the possible introduction or spread of non-indigenous or invasive species, including plants, animals, microbes, or other biological agents.

We do not anticipate transiting between water bodies while carrying ballast water. Gear and vessels will be rinsed with fresh water and allowed to dry for several days between use at multiple sites that are geographically separated to avoid transferring organisms between sites.

Project Contacts

Responsible Party: Theo Brainerd

Primary Contact: Lesley Stokes

Principal Investigator: Larisa Avens

Other Personnel

Name	Role(s)
Lisa Belskis	Co-Investigator
Emily Christiansen	Co-Investigator,Veterinarian
Jamie Clark	Co-Investigator
Matthew Godfrey	Co-Investigator
Craig Harms	Co-Investigator,Veterinarian
Ben Higgins	Co-Investigator
Joanne Braun McNeill	Co-Investigator
Wendy ED Piniak	Co-Investigator
Paul Richards	Co-Investigator
Chris Sasso	Co-Investigator
Brian Stacy	Co-Investigator,Veterinarian,Tissue Sample Disposition
Lesley Stokes	Co-Investigator

Wendy Teas	Co-Investigator

Attachments

Application Archive - (Added Aug 22, 2018)
Certification of Identity - (Added Jul 27, 2017)
Contact - Ben Higgins (Added Jul 27, 2017)
Contact - Brian Stacy (Added Mar 31, 2014)
Contact - Chris Sasso (Added Jul 27, 2017)
Contact - Craig Harms (Added Jul 27, 2017)
Contact - Craig Harms (Added Sep 27, 2010)
Contact - Jamie Clark (Added Aug 27, 2019)
Contact - Joanne Braun McNeill (Added Jul 27, 2017)
Contact - Joanne Braun McNeill (Added Jul 27, 2017)
Contact - Lesley Stokes (Added Jul 27, 2017)
Contact - Lisa Belskis (Added Jul 25, 2017)
Contact - Matthew Godfrey (Added Jul 27, 2017)
Contact - Paul Richards (Added Jul 27, 2017)
Contact - Wendy ED Piniak (Added Aug 22, 2018)
Contact - Wendy Teas (Added Jul 27, 2017)
Project Description - (Added May 29, 2018)
Project Description - (Added Mar 13, 2018)
Project Description - (Added Jul 19, 2017)
Project Description - (Added Jul 19, 2017)
Project Description - (Added Aug 7, 2018)
Project Description - (Added Dec 18, 2017)
Project Description - (Added Dec 18, 2017)
Project Description - (Added Dec 18, 2017)
Project Description - (Added Jul 27, 2017)
Project Description - (Added Dec 18, 2017)
References - (Added Dec 18, 2017)
Resources Needed - (Added Feb 21, 2018)
Resources Needed - (Added Feb 21, 2018)

Status

Application Status: Application Complete
Date Submitted: July 27, 2017
Date Completed: March 12, 2018
FR Notice of Receipt Published: March 29, 2018 **Number:** 2018-06376
Comment Period Closed: April 30, 2018 **Comments Received:** Yes **Comments Addressed:** Yes
Last Date Archived: August 27, 2019

• ESA Section 10(a)(1)(A) permit (other)

Current Status: Issued **Status Date:** August 7, 2018
Section 7 Consultation: Programmatic
NEPA Analysis: Categorical Exclusion
Date Cleared by General Counsel: August 6, 2018
FR Notice of Issuance/Denial Published: September 20, 2018 **Notice Number:** 2018-20479
Expire Date: September 30, 2027

Analyst Information:

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Modification Requests

Modifications Requested

Number	Title	Description	Status	Date Submitted	Date Issued	Issued Version
1	Add acoustics studies	Carryover request from original application to conduct acoustic studies that could not be processed in time for permit issuance. See application for request details.	Issued	08/07/2018	04/10/2019	
2	CI addition	We request to add Jamie Clark to our permit as a CI authorized for the following activities: vessel surveys (no capture), pound net, measure, cloacal/lesion/nasal swabs, fecal sampling (digital), scute scraping, epibiont removal, weigh, tetracycline injection, skin biopsy, flipper and PIT tag, and blood sampling. Jamie began working with the NMFS SEFSC sea turtle program in Beaufort, NC, in 2016 when she was a NOAA Hollings Scholar intern. During the summer of 2016, Jamie participated in field research related to the program and learned some of the methods of processing sea turtle captures, including boarding, measuring, and flipper tagging loggerhead, green, and Kemp's ridley sea turtles. Jamie returned to the Beaufort lab in July 2018 as a contractor with the sea turtle program and from that time to the present, she has participated in over 80 pound net sea turtle sampling trips and, under careful supervision, achieved proficiency in taking morphometric data, applying Inconel and PIT tags, and collecting blood and skin samples for loggerhead, green, and Kemp's ridley sea turtles.	Issued	08/27/2019	08/27/2019	

Reports

Reports Required

Nbr	Report Type	Report Period		Date Due	Status	Date Received
		Start Date	End Date			
1	Annual	08/07/2018	09/30/2019	10/31/2019	N/A	
2	Annual	10/01/2019	09/30/2020	10/31/2020	N/A	
3	Annual	10/01/2020	09/30/2021	10/31/2021	N/A	
4	Annual	10/01/2021	09/30/2022	10/31/2022	N/A	

5	Annual	10/01/2022	09/30/2023	10/31/2023	N/A	
6	Annual	10/01/2023	09/30/2024	10/31/2024	N/A	
7	Annual	10/01/2024	09/30/2025	10/31/2025	N/A	
8	Annual	10/01/2025	09/30/2026	10/31/2026	N/A	
9	Combined Annual/Final	10/01/2026	09/30/2027	10/31/2027	N/A	
10	Incident	06/14/2019	06/14/2019	06/14/2019	Submitted	06/17/2019